An Application of the Concept of Messy Problems to Supply Chain Management: An Investigation of Non-Standard Supply Chains in Humanitarian Logistics

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Abstract

Purpose: This thesis aims to develop a conceptual framework for the management of non-standard supply chains, based upon the concepts of wicked and messy problems and complex adaptive systems, and to validate it in a humanitarian logistics context. Whilst a general theory of wicked and messy problems is in existence, this has not been applied in a supply chain context. Humanitarian logistics presents a complex managerial challenge, in which standard logistics approaches and techniques have been applied with variable success. Here, the underlying generative mechanisms are explored.

Design/ Methodology / Approach: This thesis adopts a critical realist approach. A conceptual framework for messy supply chains is developed based on a review of literature on logistics and supply chain management, as well as complex adaptive systems, and wicked and messy problems. This framework is explored in the context of humanitarian logistics. After an initial round of interviews, three case studies were conducted, focusing on humanitarian responses as the unit of analysis. In total, 44 semi-structured interviews were conducted. An analysis of findings in each case is followed by the cross-case analysis of key themes, ultimately resulting in a revised framework.

Findings: All of the proposed generative mechanisms underlying the messiness in humanitarian logistics are found to be relevant. The challenges for the management of such messy supply chains lie in the behavioural complexity they represent through the mechanisms of sociopolitical impact and the multitude of diverse stakeholder views they encapsulate. Logistics and supply chain management struggles to find holistic management approaches to address such behavioural complexity appropriately.

Implications: This research has highlighted the strong element of behavioural complexity that underlies humanitarian logistics and other messy supply chains and is often inadequately addressed by managers and literature alike. The acknowledgement of all the different elements of messiness in humanitarian logistics and other scenarios, as well as the need for holistic management approaches, changes the way in which messy supply chains are seen. The revised conceptual framework presented in this thesis provides a foundation for further study of various messy supply chain contexts.

Originality/Value: This thesis provides a novel view of supply chains that are inadequately captured by current frameworks and typologies. As the complexity of supply chain contexts intensifies, behavioural aspects become increasingly important. The framework provided represents a first application of the rich body of literature on wicked and messy problems, as well as complex adaptive systems in supply chain management.

Dedication

To my late dad who would have been
so proud to see this thesis completed.

Acknowledgements

A PhD is a long and often very lonely journey, but I have been fortunate to have many wonderful travel companions who made the completion of this thesis possible, even though these past few years have been marred by much sickness and death. Without you, I would not be standing here today, and I certainly would not have written all of this.

I am grateful to my supervisors, Dr. Maja Piecyk, Dr. Nigel Caldwell, and Dr. Phil Greening for their support and guidance throughout my work on this thesis. Your feedback was very valuable. You have been my guides into this foreign land of academia and have opened my mind to entirely new ways of thinking.

My sincere thanks to all of the interviewees who gave up their valuable time to provide insights into highly challenging environments. In total, people in twelve different countries participated in this research, often braving technological issues to be able to share their experiences and opinions.

Thanks to everyone at the Logistics Research Centre at Heriot-Watt University for their support and to my fellow PhD students for always being there for me when the going got tough, but also to enjoy many happy moments. I have many fond memories of the time we spent together. Thanks also to my colleagues at the University of Lincoln, particularly to my mentor Prof. Ted Fuller. 2106, over the past two years you have become an invaluable support network and I could not have asked for a better group of friends in this stressful period of splitting my time between lecturing and PhDing.

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Last, but not least, I want to thank my mum, Sylvia Schiffling, who has patiently supported me through the ups and downs of this PhD journey despite her own struggles.

Declaration Statement
ACADEMIC REGISTRY
Research Thesis Submission

Name*:*	Sarah Aline Schiffling		
School:	School of Social Sciences		
Version: *(i.e. First, Resubmission, Final)*	Final	Degree Sought:	PhD in Logistics and Supply Chain Management

Declaration

In accordance with the appropriate regulations I hereby submit my thesis and I declare that:

1) the thesis embodies the results of my own work and has been composed by myself
2) where appropriate, I have made acknowledgement of the work of others and have made reference to work carried out in collaboration with other persons
3) the thesis is the correct version of the thesis for submission and is the same version as any electronic versions submitted*.
4) my thesis for the award referred to, deposited in the Heriot-Watt University Library, should be made available for loan or photocopying and be available via the Institutional Repository, subject to such conditions as the Librarian may require
5) I understand that as a student of the University I am required to abide by the Regulations of the University and to conform to its discipline.
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1. Introduction

Not all supply chains (SCs) are easily captured by standard management approaches or sit comfortably within established taxonomies of SC types. Given the wide range of contexts, there is no such thing as a standard SC, but a variety of approaches have been developed over time to comprehend and manage a variety of different SCs. Academic thinking has moved on from strictly prescriptive SC types and recognises the increasing complexity of SC problems. Based on literature on "wicked" (Rittel and Webber 2007) or "messy" problems (Ackoff 1981), as well as complex adaptive systems (CAS) (Choi et al. 2001, Surana et al. 2005, Pathak et al. 2007) this thesis develops a conceptual framework for non-standard SCs that do no fit well within existing typologies. This framework is subsequently explored in the context of humanitarian logistics (HL). A revised conceptual framework is presented, building upon the analysis of the primary data, and implications of these types of SCs are discussed.

This chapter introduces background information to the research project and is subdivided into four sections. Firstly, research background is provided, giving an overview of the key areas of literature utilized in this project and the motivation for the work, which introduces the concept of messy SCs (MSCs) based upon the literature on wicked and messy problems, as well as CAS, and applies it in the context of HL. Secondly, the research aim and objectives addressed in this thesis are detailed. Furthermore, the scope of the research is outlined. Finally, the chapter details the structure for the entire thesis outlining the content of each of the following chapters.

1.1 Research Background

This thesis explores non-standard SCs such as those forming in the context of HL. HL is a system concerned with *"planning, implementing and controlling the effective, cost-efficient flow and storage of goods and materials as well as related information, from the point of origin to the point of consumption for the purpose of meeting the end beneficiary's requirements"* (Thomas and Mizushima 2005, p.60). Humanitarian operations are complex, involve many different players, and have a significant financial value. Military, governmental, and private organisations of various sizes, motivations and abilities are typically involved (Kovács and Spens 2009, Tatham and Houghton 2011, Kovács et al. 2012, Pérouse de Montclos 2012). Tatham and Pettit (2010)

estimated the humanitarian sector's annual expenditure at more than US$25 billion. SC activities are approximated to account for as much as 60-80% of the total cost of humanitarian operations (Blecken 2010). Therefore, efficient and effective HL is vital from an economic standpoint, in addition to the moral imperative underlying humanitarian operations.

Both academic and professional interest in HL has grown significantly in recent years, reflecting an increase in frequency and magnitude of disasters in terms of the number of people affected and the economic impact on affected regions. The demand for disaster relief is high and growing. In 2013, 148.2 million people were affected by natural disaster and conflict. As response operations to crises are becoming both longer-lasting and more expensive, inter-agency funding appeals have reached an all-time high in 2014 with more than US$ 17.9 billion being requested (United Nations OCHA 2015).

Disasters do not only impact the immediately affected area, but have also lead to severe disruptions of global SCs, for example in the high-tech industry when facilities in Japan were hit by the earthquake and tsunami in 2011 (Gattorna 2006, Day et al. 2012). Improving HL is therefore also in the interest of commercial SC managers and academics. In addition, there are cross-learning opportunities from research done in this area. Insights from HL can inform commercial operations, for example in regards to resilience and rapid adaptation to change in emergent international SC structures (Day et al. 2012). Despite the unique operating environment, HL still operates according to the basic premises of commercial logistics and SC management. Techniques and strategies from commercial SC management have been applied to the humanitarian context in many instances, but this has not always resulted in the desired outcomes as expected based on commercial experience (Day et al. 2012). Therefore, this study introduces and explores a conceptual framework that aims to lead to a better understanding of the circumstances that cause this varied success in the adaption of commercial SC practice to the HL context by exposing the underlying generative mechanisms.

Conventionally, SCs are depicted as linear connections including the flow of materials, information and money through several tiers of suppliers to a focal company and on to customers, until they ultimately reach the end consumer (Mentzer et al. 2001, Mangan et al. 2008, Waters 2009, Chopra and Meindl 2010, Harrison and Van Hoek 2011). This is the basic underlying principle of much of the operations and SC management academic literature. However, over time, differences in SCs have garnered increasing levels of attention. In the operations management literature, different types of

SCs have been discussed. Fisher (1997) distinguishes between efficient SCs for functional products and responsive SCs for innovative products, basing this differentiation mainly on the characteristics of the physical products' customers' demand. Well-known SC types are lean and agile SCs (Mason-Jones and Towill 1999a, Christopher 2000, Mason-Jones et al. 2000). Lean SCs are noted for their high emphasis on efficiency, while agile ones are primarily concerned with flexibility in responding to unpredictable demand patterns.

As the business environment becomes increasingly vulnerable to disruption, SCs need to exhibit higher levels of flexibility, not merely in reacting to fluctuating demand, but also in adapting their structures to changes in their wider operating environment (Christopher 2005). Uncertainty, fluctuating organisational structures, and the need to accommodate a range of differing and often conflicting demands from stakeholders have become features of many SCs (Day et al. 2012). However, much of the growing body of SC management literature concentrates on SCs with mature attributes, such as stable organisational structures, a certain level of predictability, and agreement on the aims of a SC, as well as the acceptable ways of achieving those aims. SCs with less mature operating characteristics receive less attention.

This thesis focuses on a particular type of SCs that is non-linear, highly complex, and has a significant impact on stakeholders and society as a whole, so-called "messy SCs" that present "wicked" (Rittel and Webber 1973), or "messy" problems (Ackoff 1981). Furthermore, the thesis builds upon existing literature that views SCs as CAS (Choi et al. 2001, Surana et al. 2005, Pathak et al. 2007).

Complex problems that involve the wider environment and have political and social dimensions, beyond their mere technical or operational issues, have been called wicked (Rittel and Webber 2007) or messy (Ackoff 1981). Messy problems are *"complex, emergent, interdependent problems spiraling near the edge of chaos"* (Calton and Payne 2003, p. 7). Wicked problems are defined as *"social systems problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing"* (Churchman 1967, p.141). Both concepts stress the complexity of the situations they address.

It has been suggested that HL presents a "wicked" problem (Tatham and Houghton 2011). Based on literature on "wicked" (Rittel and Webber 2007) or "messy" problems (Ackoff 1981), a conceptual framework has been developed, identifying five "wicked" or "messy" characteristics SCs can exhibit. This will further the

understanding of the aspects of the context of HL that lead to the conditions that influence the relationship between the application of SC knowledge and the outcomes achieved in the context of humanitarian relief. This thesis provides an alternative theoretical stance on non-standard SCs, building upon previous work such as viewing SCs as CAS (Choi et al. 2001, Surana et al. 2005, Pathak et al. 2007). Furthermore, it adds to the scarce empirical evidence base in HL, an area in which there have been frequent calls for more empirical research, although the difficulties of collecting primary data have also been acknowledged (Kovács and Spens 2007, Kovács and Spens 2009, Natarajarathinam et al. 2009, Pettit and Beresford 2009, Pedraza-Martinez et al. 2011). Many publications in HL are conceptual, while rigorous and relevant empirical research is comparatively scarce (Kovács 2012).

1.2 Research Aim and Objectives

The purpose of this thesis is to contribute to the improved design and management of non-standard SCs, as well as to develop a conceptual framework that enables further research to be conducted in a structured way. Whilst a general theory of wicked and messy problems is in existence, this has not been applied in a SC context.

This thesis aims to develop a conceptual framework for the management of non-standard SCs, based upon the concepts of wicked and messy problems and CAS, and to establish the conceptual framework as a robust tool in a HL context. In line with this main research aim, the following objectives have been developed:

1. To investigate the characteristics of non-standard SCs with a particular focus on HL.
2. To develop a conceptual framework for management of non-standard SCs.
3. To design and carry out empirical research to explore the proposed conceptual framework in the context of HL.
4. To refine the proposed conceptual framework based on empirical research findings.
5. To discuss the applicability of the refined conceptual framework to the management of non-standard SCs.

To address these research objectives, the research process has been subdivided into several stages:

1. A comprehensive literature review was conducted to establish the concept of “messy SCs” based upon previous publications.

2. A detailed background to the research context of HL as presented in extant literature was provided.
3. A conceptual framework was developed taking into account previous studies in related subject areas, broader considerations of research paradigms and approaches, as well as the data needed to address this particular research aim.
4. Primary data was collected in the form of semi-structured interviews in one round of initial interviews, as well as three case studies with the unit of analysis being humanitarian responses.
5. A case-by-case analysis of empirical research findings was presented and cross-case analysis and discussion was provided.
6. The proposed conceptual framework was revised and conclusions were drawn from the empirical research study.

1.3 The Scope of the Research

This thesis is concerned with the characteristics of non-standard SCs and their implications upon a research, management, and policy context. While a general conceptual framework for this type of SCs is proposed, which is potentially applicable across a wide range of research contexts, this thesis is concerned solely with its application in HL as one example of a suitable context in which non-standard SCs occur.

Within the area of HL, three distinct case studies are conducted that represent different humanitarian responses, thus responding to calls for cross-organizational case studies (Kunz and Reiner 2012). While these case studies have been developed to cover a broad spectrum of activity under the remit of HL, they cannot be seen as representative of all HL activity. However, the case studies were conducted across various geographical conditions and cultural backgrounds, therefore covering multiple operating circumstances. Although there might be some very specific issues raised in the primary research, the framework applies to SCs around the world.

The two emergency responses that form case studies for this thesis occurred in 2010, with the research therefore covering a broad timeframe beyond the immediate response phase. The developmental response case study spans more than a decade to allow for a more nuanced retrospective assessment by the participants in the primary research.

The consideration of other research contexts, as well as a more general application within the area of HL, lies outside the scope of this research. The conceptual framework is explored as a robust tool in HL and refined according to the primary research findings. It could then be generalized in further research both within HL and in other contexts. The research in this thesis contributes to the growing body of knowledge in HL.

1.4 Thesis Structure

The remainder of this thesis is subdivided into five chapters and consists of three parts (see Figure 1). Chapters 2 and 3 form the theoretical part in which a review of extant literature is presented and questions of research methodology are outlined. Chapters 4 and 5 form the empirical part of this thesis, in which a case-by-case analysis of empirical research findings is presented and cross-case analysis and discussion is provided. Chapter 6 forms the conclusion of the thesis, summarizing key findings before discussing the overall contribution to knowledge, as well as stating the limitations of the work and outlining directions for future research.

Chapter 2 consists of two distinct parts. The first part of the chapter introduces the terms logistics and SC management and goes on to provide a discussion of non-standard SCs, linking this subject matter to the study of CAS, as well as wicked and messy problems. It culminates in the development of the proposed conceptual framework for MSCs. The second part of the chapter introduces the context of HL, providing suitable definitions and background information based upon existing literature, and views it through the lens of the proposed conceptual framework.

Chapter 3 provides a discussion of ontology and epistemology, as well as research paradigms, before detailing the research framework and research methods applied in this thesis. Furthermore, trustworthiness of the research according to the criteria of credibility, transferability, dependability, and confirmability is addressed.

Chapter 4 offers a case-by-case analysis of the findings of the empirical study. Findings from the initial round of interviews, as well as each of the three case studies, which represent different humanitarian responses, are presented according to the five elements of the proposed conceptual framework.

Chapter 5 subsequently provides a cross-case analysis and discussion of findings, which contrasts key themes from the data analysis with those found in the extant literature. The chapter culminates in the development of a revised conceptual framework and its discussion in both HL and a more general SC context.

Chapter 6 concludes the thesis, summarizing key findings before elaborating upon the overall contribution to knowledge, as well as the limitations of the work. Finally, directions for further research are outlined.

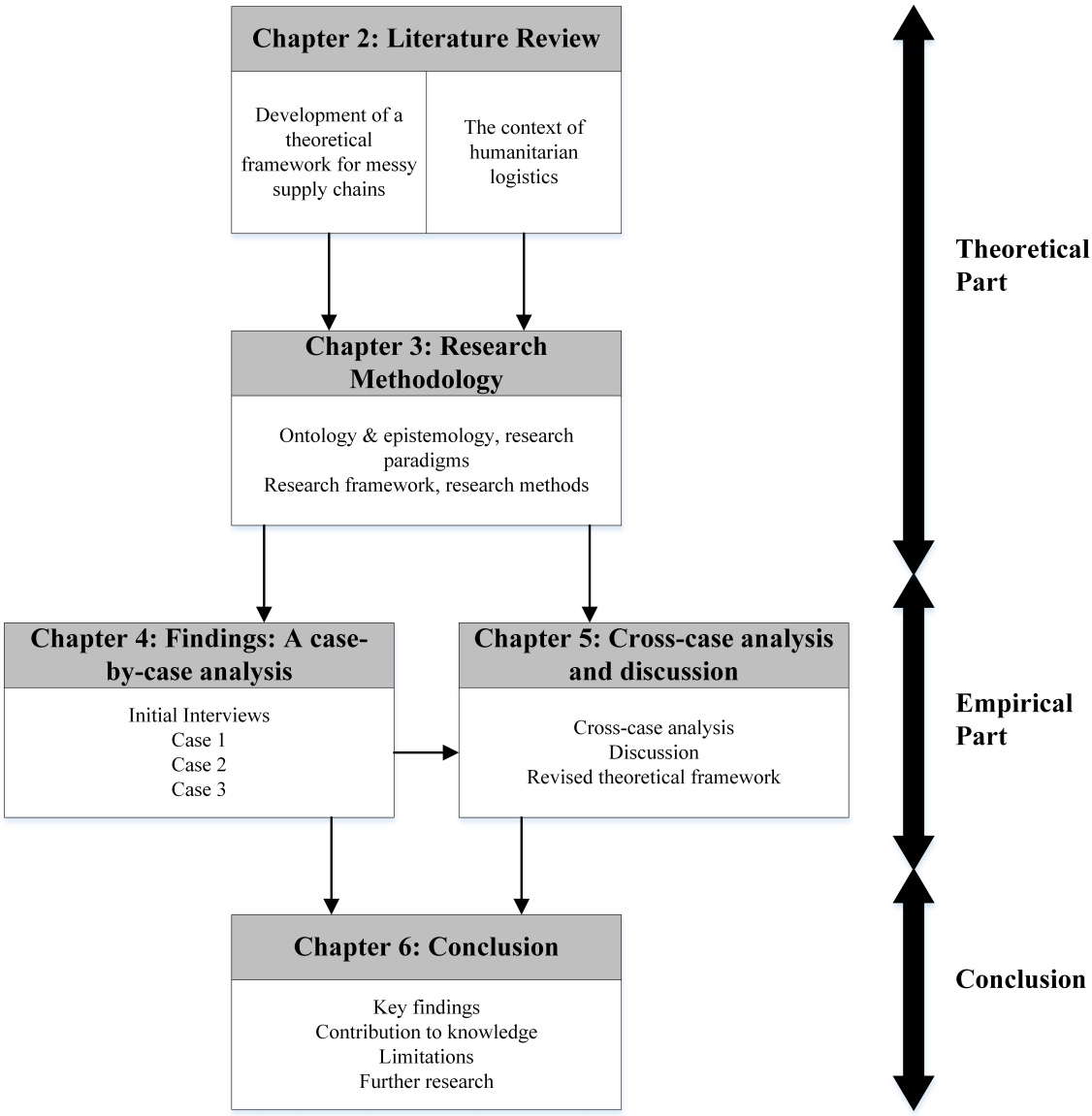


Figure 1: Thesis Structure (author's own figure)

1.5 Summary

This thesis is expected to contribute to the better understanding of non-standard SCs by offering an alternative theoretical base for their analysis through wicked and messy problems, and CAS. The conceptual framework developed within this research is initially applied in the context of HL, but can in the future also be used in relation to

other non-standard SCs. Potential areas of application could be related to military SCs, medical SCs, or sporting and events SCs.

This chapter has provided an outline of the research background, as well as a presentation of the research aim, and objectives. Furthermore, the scope of the research has been set out and the structure of the thesis has been detailed.

2 Literature Review

This chapter provides an in-depth discussion of the various streams of literature that constitute the background of this thesis. It addresses two of the research objectives by developing a conceptual framework for the study of non-standard SCs and viewing the context of HL through the lens of the proposed conceptual framework.

2.1 Definitions

This section specifies the concepts of logistics and SC management. These terms will be used throughout this research, therefore clear definitions are essential to ensure a consistent understanding of these concepts, particularly since there is considerable debate among practitioners and researchers alike regarding the correct use of the terms (Lummus et al. 2001). Furthermore, HL is defined below, as HL provides the context for the primary research carried out as part of this thesis.

2.1.1 Logistics

The concept of logistics originates within the armed forces. Historically, logistics can be defined as *"the practical art of moving armies and keeping them supplied"* (Van Crefeld 2004, p.1). A significant part of military success or failure throughout history can be attributed to the efficient and effective management of logistics. For example, lacking local sources of supply, Britain struggled to keep its army fed and equipped in the American War of Independence (Christopher 2005). Whereas smaller armies were still able to support themselves from the land, the expansion of the size of armed forces necessitated the development of more sophisticated logistics to maintain adequate supply of materiel. For instance, while the Franco-Prussian war of 1870 showcased the power of the railway in supporting military operations, the First World War 1914 demonstrated the limits of what this mode of transport could deliver, necessitating faster and more flexible transport for future military campaigns (Van Crefeld 2004).

However, the requirement to transport supplies over long distances in challenging conditions and in large quantities is not limited to military operations (Lummus et al. 2001, Christopher 2005). The idea of employing logistics for non-military operations has been gaining importance ever since the industrial revolution and has long been recognised as a key competitive element for companies (Grant et al. 2006, Mangan et al. 2008, Schönsleben 2016). Inbound and outbound logistics are two of the primary value-creating activities within Porter's value chain analysis, demonstrating logistics'

importance in the modern business world, which is focussed on adding value to the goods or services for the end customers (Porter 2004).

In a modern business sense, Christopher (2005) defines logistics as *"a planning orientation and framework that seeks to create a single plan for the flow of products and information through a business"* (p.4). The consensus among practitioners is that logistics is a function within one company (Lummus et al. 2001). However, academic literature has traditionally taken the view that logistics should be regarded as spanning the entire product life cycle (Cooper et al. 1997, Mangan et al. 2008, Schönsleben 2016). This *"cradle to grave"* approach encompasses many activities beyond the mere transport and storage, which are ordinarily linked with logistics. Indeed, logistics has evolved from complete fragmentation into individual small functions back in the 1960 to total integration within one overarching logistics function (Coyle et al. 1996).

One body striving for a clear definition of logistics and SC management is the Council of Supply Chain Management Professionals (CSCMP), which provides the following definition of logistics management (Vitasek 2010, p.114):

"Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements"

This definition encompasses the three key flows of goods, services, and information. The complete life cycle of a product or service from origin to consumption, also incorporating reverse flows, is included. The definition focuses on efficiency and effectiveness in meeting the customers' requirements, which provides a clear service orientation, but also a sense of striving for improvement.

2.1.2 Supply Chain Management

The term SC management first appeared in practitioner literature in 1982 with much of the early application of the term being by consultants (Cooper et al. 1997, Ellram and Cooper 2014). Its relation to the established concept of logistics has been contentious ever since (Carter and Ellram 2003, Grant et al. 2006, Mangan et al. 2008). A SC is generally defined as *"a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a to a customer, (and return)"* (Mentzer et al. 2001, p.4), but the exact definition of SC management remains contentious (Stock and Boyer 2009, Ellram and Cooper 2014). A variety of different definitions of SC

management have been discussed in literature with a particular focus on trying to distinguish it from logistics (Skjoett-Larsen 1999, Lummus et al. 2001, Mentzer et al. 2001, Christopher 2005). While there is still no consensus on the matter, several key themes have emerged.

Larson and Halldórsson (2002) provide a four group taxonomy for the relationship between purchasing and SC management, which has also been used to describe the relationship between logistics and SC management (Day et al. 2012). This taxonomy is illustrated in Figure 2. The *Traditionalist* position views SC management as an issue within logistics (Long 2003). It is not seen to be covering the same breadth or depth as logistics. Conversely, the *Relabeling* perspective regards SC management simply as a new name for logistics. This is consistent with research that shows both terms being used as synonyms by both practitioners and researchers (Cooper et al. 1997, Skjoett-Larsen 1999). The *Intersectionist* perspective sees logistics and SC management as partially overlapping areas, which is supported by findings from a survey conducted by Lummus et al. (2001). While definitions of SC management and logistics are vague and often confused among practitioners, the general consensus is that logistics occurs within one company whereas SC management spans the entire SC with both covering similar core issues, which would be the overlapping part in Larson & Haldórsson's (2002) diagram. This research adopts the fourth, the *Unionist,* perspective in which logistics is a part of SC management, which encompasses it completely. The reasons for this will be explained below.

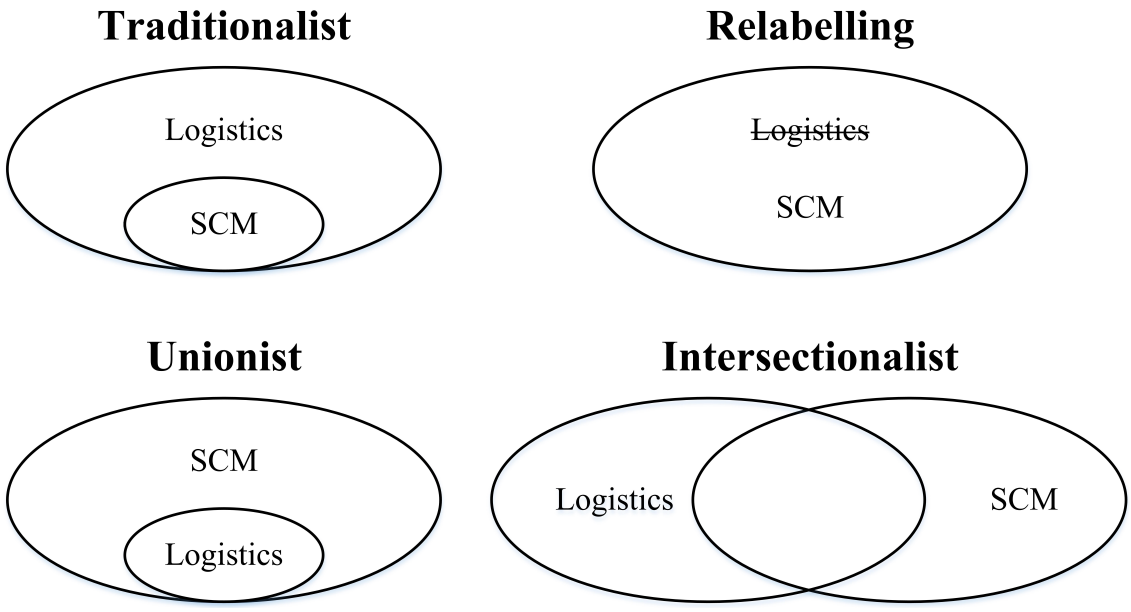


Figure 2: Four Perspectives on Logistics vs. SC management (adapted fromLarson and Halldórsson 2002, p. 37).

SC management includes the entire journey of a product from origin to disposal, as well as any reverse flows (Long 2003, Ellram and Cooper 2014). However, this could equate SC management to a more sophisticated view of logistics, one that is rather common in modern logistics literature, although not quite as widely accepted among practitioners (Lummus et al. 2001). This view has also been adopted in the CSCMP definition of logistics. Therefore, the true core differences between logistics and SC management must lie deeper.

Christopher (2005, p.4) states that SC management is a *"wider concept than logistics",* which builds on the framework set by logistics, but strives to integrate processes across organizational boundaries. This boundary-spanning nature that extends beyond one company and strives for overall effectiveness and efficiency is a key characteristic of SC management (Coyle et al. 1996, Carter et al. 2008, Ellram and Cooper 2014). This is in sharp contrast to logistics, which is primarily working with the unit of analysis of one focus company. While interaction has to occur, logistics does not strive to intensify the interactions to more than arms-length relationships. The focus of a SC is on close, enduring relationships and long-term strategic issues (Mentzer et al. 2001, Patel et al. 2013). This could also indicate that the time horizon is different and short-term inefficiency and ineffectiveness might be accepted to achieve lower cost, higher customer satisfaction and therefore a competitive advantage in the long run. This has been illustrated in Figure 3.

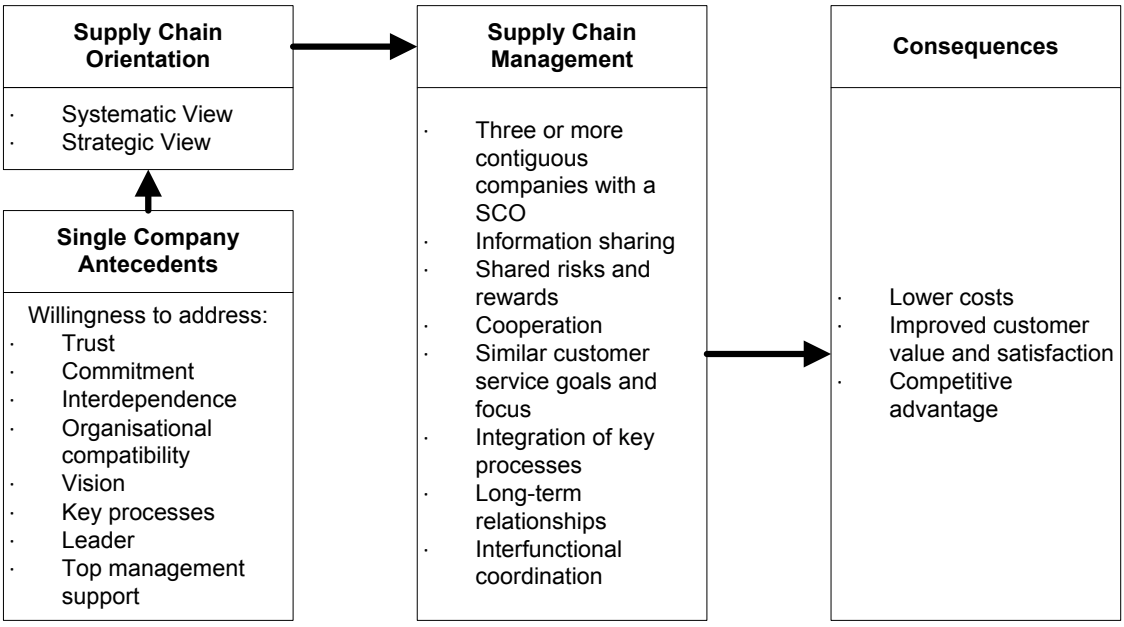


Figure 3: Supply Chain Management Antecedents and Consequences (Mentzer et al. 2001, p.12)

As can be seen in Figure 4, Mentzer et al. (2001) stress the importance of putting the SC in a wider context, including all the SC flows and various business functions that go far beyond the logistics department. Even within one company, SC management is therefore a different concept than logistics. It is more strategically oriented and not restricted to one organizational function, where activities are integrated into complex processes rather than managing each one individually (Grant et al. 2006). This integration of internal, as well as external functions can achieve a competitive advantage through adding value and enhancing the customer experience (Cooper et al. 1997, Lummus et al. 2001). This more strategic orientation and holistic perspective are key criteria of SC management (Patel et al. 2013, Ellram and Cooper 2014).

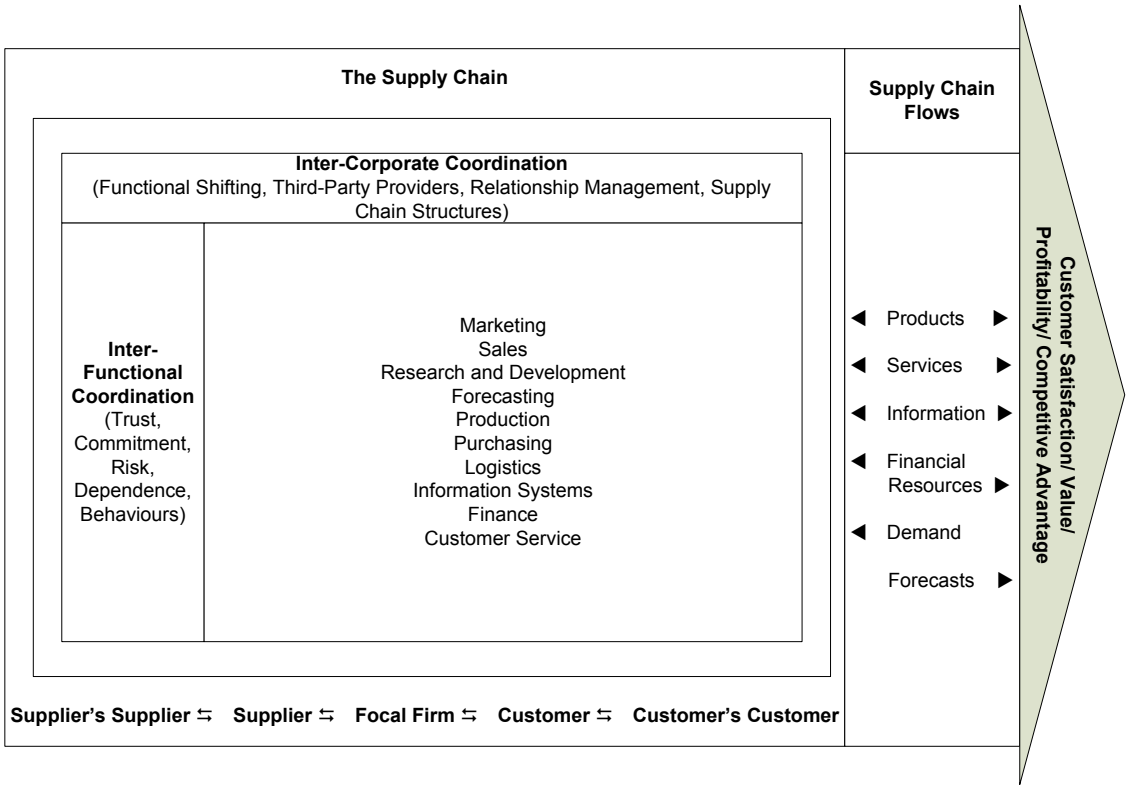


Figure 4: A Model of Supply Chain Management (Mentzer et al. 2001, p.19)

The integration of different functions within a company, as well as the development of close long-term relationships beyond organisational boundaries represent the more strategic orientation of SC management, which is entirely focused on overall improvement rather than a fragmented approach. Overall, SC management focuses on cooperation in the sense of the systems thinking approach that the whole is greater than the sum of its parts (Mentzer et al. 2001, Christopher 2005, Grant et al. 2006, Patel et al. 2013, Ellram and Cooper 2014). This understanding of SC management can be seen as an evolution and further development of logistics that adds

further areas to the original definition (Coyle et al. 1996, Ballou 2007). This approach is illustrated in Figure 5.

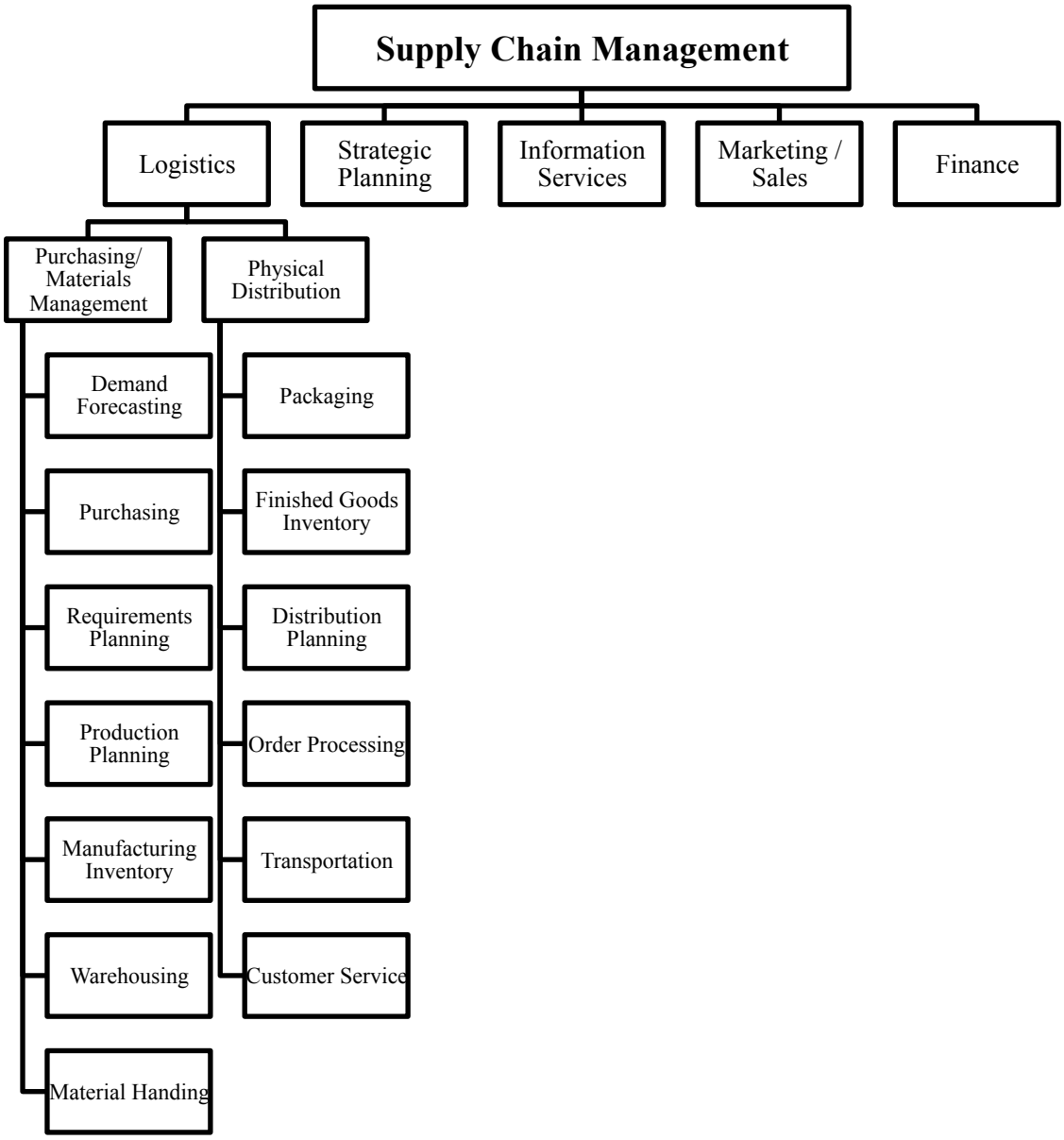


Figure 5: Logistics Evolution to Supply Chain Management (Ballou 2007, p.338)

The commonly used CSCMP definition of SC management is (Vitasek 2010, p.180):

"Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies."

This definition, as well as the depiction in Figure 5, reflects the wider nature of SC management as a boundary-crossing, strategic concept. The activities listed are much broader than the ones that are part of the definition of logistics that has been presented previously.

2.1.3 Humanitarian Logistics

Having defined logistics and SC management, HL will now be introduced. Despite the long history of disaster relief and humanitarian operations, academic research on the logistics of humanitarian work has only started relatively recently (Chandes and Pache 2010). HL has only been a field of research interest since about 2000 (Tatham and Pettit 2010). The focus in both research and practice is only now shifting away from logistics and towards SC management according to the manner in which the two concepts have been defined earlier. Similarly to commercial sectors in the 1980s or 1990s, SC management is only slowly developing in the humanitarian context (Tatham et al. 2009). HL is the preferred term within the humanitarian community, but its definition is much broader than the common use of logistics within the commercial area, so often SC activities are re-labelled as logistics and the terms are used interchangeably (Van Wassenhove 2006, Tatham and Hughes 2011, Tatham and Spens 2011). Other researchers use the term "humanitarian logistics and SC management" to cover both and do not differentiate between the two (Tatham et al. 2009, Cozzolino 2012). Logistics is the prominent term in humanitarian research, as evidenced by Day et al. (2012) who conducted a keyword search that yielded five times as many results for humanitarian keywords combined with "logistics" instead of "SC management".

In an advisory committee of senior logistics representatives, the Fritz Institute developed the following definition of HL (Thomas and Mizushima 2005, p.60):

"The process of planning, implementing and controlling the effective, cost-efficient flow and storage of goods and materials as well as related information, from the point of origin to the point of consumption for the purpose of meeting the end beneficiary's requirements."

This definition is also used by the United Nations' (UN) Logistics Cluster in their Logistics Operational Guide following a discussion of the ambiguity of terms in the area (Anonymous 2013). The Fritz Institute definition is also widely accepted within the academic community and has been used in numerous papers (for example Van Wassenhove 2006, Jahre et al. 2009, Kovács and Spens 2009, Tatham and Pettit 2010,

Overstreet et al. 2011, Tatham and Hughes 2011, Day et al. 2012). Earlier publications did not provide definitions as such, but utilized comparisons with commercial logistics and military logistics (Long and Wood 1995, Long 1997). The aforementioned definition was based on further research into common themes among the challenges that organizations were facing in HL (Gustavsson 2003, Thomas 2004).

Day et al. (2012) point out that the Fritz Institute definition of HL is mostly focussed on operational issues and depicts a logistics function that is only activated after the occurrence of a disaster. As this definition was developed mostly by practitioners, its focus on operational issues and disregard of strategic considerations and cooperation might indicate a lack of SC management in humanitarian operations. Indeed, a lack of inclusion of HL in strategic planning in humanitarian organisations has been criticised (Gustavsson 2003, Thomas and Mizushima 2005). However, progress has been made towards a more integrated and collaborative approach to HL, moving it closer to SC management (Tatham and Christopher 2014, Tatham and Rietjens 2016).

In their definition of humanitarian and relief SC management, Day et al. (2012, p.28) therefore describe it as a system that is among other things *"responsible for designing, deploying and managing the processes necessary for dealing with not only current but also future humanitarian/disaster events"*. This includes a focus on the future that is not evident in the earlier Fritz Institute definition, adding a more strategic dimension to HL. In their editorial to the first issue of the *Journal of Humanitarian Logistics and Supply Chain Management,* Kovács and Spens (2011) acknowledge that HL is a developing and constantly evolving field, which is enhanced by being more comprehensive than commercial logistics, as it is *"an interdisciplinary field that combines aspects of logistics with water and sanitation, health care, development studies, and disaster management"* (p. 6). Therefore, while this thesis conforms to the Fritz Institute's definition in principle, the strategic aspects of a wider SC view are taken into account, as well as honouring the various viewpoints that an interdisciplinary field of research necessitates.

HL is a SC problem so an understanding of ways of organising SCs in more structured environments is essential to attempt to build approaches to HL. The next section will detail various approaches to SC management.

2.2 Non-standard Supply Chains

After the establishment of appropriate working definitions of key concepts within this thesis, this section of the literature review explores non-standard SCs. First,

different ways of classifying types of SCs are highlighted. Then, approaches applicable to SC types that are not adequately captured by the common classifications are discussed, including CAS and the study of wicked and messy problems, which has not previously been applied in the context of SC management. Finally, a conceptual framework for non-standard SCs is developed.

While there is no such thing as a standard SC, a variety of approaches have been developed over time to comprehend and manage a wide range of different SCs. As later parts of this section highlight, academic thinking has moved on from strictly prescriptive SC types and recognises the increasing complexity of SC problems.

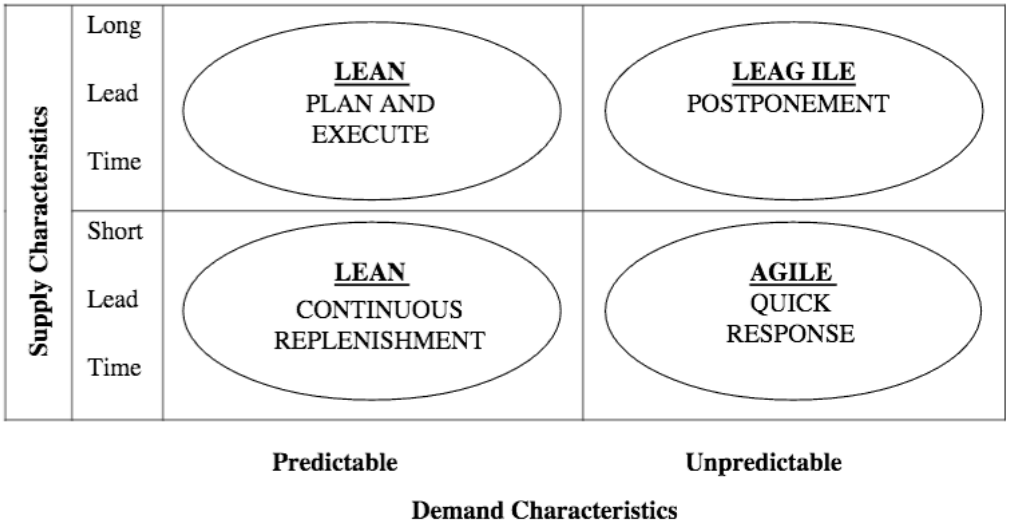
2.2.1 Supply Chain Types

The idea that competition in the modern business world is no longer between individual companies, but instead between entire SCs, was first introduced by Martin Christopher (1992). It has since gained traction within the logistics and SC research community, as well as being shown to be increasingly relevant in practice as the importance of strong SCs as a basis for sustained competitive advantage grows (Mangan et al. 2008). Conventionally, SCs are depicted as linear connections including the flow of materials, information, and money through several tiers of suppliers to a focal company and on to customers, until they ultimately reach the end consumer (Mentzer et al. 2001, Mangan et al. 2008, Waters 2009, Chopra and Meindl 2010, Harrison and Van Hoek 2011). This is the basic underlying principle of much of the relevant academic literature. However, over time, differences in SCs have garnered increasing levels of attention, with clear distinctions being developed between SC types that suit various organisations or products.

Arguably the most well known SC types are lean and agile SCs (Mason-Jones and Towill 1999a, Christopher 2000, Mason-Jones et al. 2000, Rigby et al. 2000, Taylor and Brunt 2001, Womack and Jones 2005). Lean SCs are noted for their high emphasis on waste elimination and efficiency, while agile ones are primarily concerned with flexibility in responding to unpredictable demand patterns. Lean production and logistics can be traced back to the Toyota Production System, first introduced to a world-wide audience in the book *The Machine that Changed the World* (Womack et al. 1990), and subsequently revolutionising manufacturing around the world (Womack and Jones 2005). In response to increased volatility in modern markets, the concept of agile SCs was developed, encompassing processes and structures that enable SCs to handle highly changeable demand (Christopher 2000). While lean SCs are focused on high

volume, low variety products with predictable demand patterns and lead times, agile SCs are centred on quick decision making to respond flexibly to unpredictable and rapid changes in demand (Mangan et al. 2008, Gattorna 2009).

Among the well known SC types are those proposed by Fisher (1997) who distinguishes between efficient SCs for functional products and responsive SCs for innovative products. Fisher's seminal paper was written at a time when SCs were a relatively new way to describe interactions between companies in academic research (Lambert and Cooper 2000, Chen and Paulraj 2004). This early distinction between different types of SCs highlights the importance of adapting SCs to circumstances. In the case of Fisher, SC design is determined primarily by the product a SC is delivering to the market place (Krishnan and Ulrich 2001). In particular, the nature of product demand is regarded as a crucial differentiator between SC types, as functional products are characterised by long life cycles, low variety, long lead times, and a predictable demand; by contrast, innovative products exhibit unpredictable demand, shorter life cycles, high variety, and short lead times (Fisher 1997).



Supply demand characteristics	Resulting pipelines
Short lead time + predictable demand	Lean continuous replenishment
Short lead time + unpredictable demand	Agile quick response
Long lead time + predictable demand	Lean, planning and execution
Long lead time + unpredictable demand	Leagile production/logistics postponement

Figure 6: A taxonomy for selecting global supply chain strategies (Christopher et al. 2006)

Further building upon the notion that predictability of demand and replenishment lead times should determine the management of SCs, Christopher et al. (2006) proposed a taxonomy for the selection of global SC strategies (Mangan et al. 2008). The matrix

shown in Figure 6 demonstrates the differentiation between lean SCs, agile SCs, and the hybrid strategy of leagile SCs that combine elements of both of the aforementioned strategies to balance long lead times and an unpredictable demand pattern, primarily through postponement (Christopher et al. 2006). This further develops the thought that relying strictly on either lean or agile SCs may diminish the power of either paradigm in adapting to the marketplace environment (Mason-Jones et al. 2000). Christopher et al. (2006) stress the importance of continuous assessment of both product range and marketplace characteristics in order to facilitate flexibility in adapting to both internal and external change by employing suitable SC strategies.

Putting further emphasis on the need for SCs to have dynamic capabilities enabling them to respond flexibly to changes, Gattorna developed the concept of dynamic SCs (2009). Dynamic SCs are built on the premise that SCs are deeply flawed for failing to put customers' special needs and wants at the centre of their endeavours, but rather focussing on the product. However, it needs to be acknowledged that one product can trigger various types of demand among different customers, or even with the same customer as needs change over time (Gattorna 2006, Gattorna 2009). This is a clear argument against product-centric SC design. Furthermore, Gattorna (2009) acknowledges the importance of people as the key drivers of dynamic SCs, highlighting their capability to induce flexibility and elicit change (Mangan et al. 2008).

Based upon the study of more than 60 global companies' SCs, Lee (2004) concludes that greater speed and cost-effectiveness in the SC did not equate to gaining a substantial competitive advantage because the resultant SCs were too inflexible to respond adequately to changes in demand. Lee (2004) emphasises three aspects that are common to the best SCs, which he calls Triple A SCs:

- *Agility:* As both demand and supply fluctuations increase in both magnitude and speed, there is a need to respond quickly and cost-efficiently to changes.
- *Adaptability:* To gain sustainable competitive advantage, SCs need to be adapted to changes in strategies or the markets.
- *Alignment:* It is critical to align the interests of all the firms in a SC as every firm attempts to maximise its own interests and only alignment will result in maximised SC performance.

Further research has demonstrated that a Triple A SC strategy yields superior SC performance, which in turn results in a positive impact on organisational performance (Whitten et al. 2012). Nonetheless, SC design should not be regarded as a panacea, as

even the most responsive SC is unable to counteract the negative influence of a lack of attractive products (Christopher et al. 2006).

In addition to the previously discussed variants of SCs, Quinn argues that SC success can only be achieved if the three critical elements of people, process, and technology, are balanced (Quinn 2004). The idea stems from wider business principles, but a particular focus in SCs should be on people as they execute processes and utilise technology (Quinn 2004, Quinn 2011). The role of people in the SC becomes particularly pronounced during crisis situations (Quinn 2011). The people in the SC are of primary importance in service SCs as they play an essential role in the delivery of the service and interact directly with the customer (Sampson and Froehle 2006, Sampson 2010). A further complicating factor is the bidirectionality of service SCs both with customers and with suppliers (Sampson 2000, Maull et al. 2012). The recognition of the importance of services SCs and customer participation is growing among the SC community (Sampson 2000, Baltacioglu et al. 2007, Maull et al. 2012, Sampson 2012).

Similarly, closed-loop SCs have gained importance, which also feature bidirectional flows, as they "focus on taking back products from customers and recovering added value by reusing the entire product, and/or some of its modules, components, and parts" (Guide and Van Wassenhove 2009, p.10). Since the early 1990s, returns, but also remanufacturing has become a focus in the value creating activities of many commercial operations and apart from the purely technological and operational capabilities, the challenges for SCs in handling these unusual reverse flows have gained importance in both academic and professional discourse (Lund 1996, Guide 2000). The necessity to address such issues as both inter-organisational and inter-disciplinary problems has been highlighted (Guide and Van Wassenhove 2009). A particular concern have been the management of often complex SCs as various members are involved, but the question of responsibility and oversight for reverse flows needs to be solved as these gain in importance (Savaskan et al. 2004, Debo et al. 2005).

This section has shown that despite the existence of well-established SC types in the literature, various authors have concentrated efforts on capturing the complex reality of modern SCs in ever-different descriptions. Increasingly, the concept of supply networks as an extension of SCs is used to address the complexity that cannot necessarily be represented within the linear structure of a chain (Choi et al. 2001, Choi and Hong 2002, Christopher 2005, Kovács and Tatham 2009, Gadde et al. 2010, Purvis et al. 2014). In attempting to harness the impact SCs have on revenue, cost of goods sold, administration, and finance in business, and thus on gaining a competitive

advantage (Millar 2015), special attention has to be paid to resilience, an idea rooted in the science of ecosystems (Christopher and Peck 2004). Highlighting the extreme complexity and interconnectedness that SC strategies have to contend with, Millar (2015) thus introduces the term SC ecosystems.

2.2.2 Non-Standard Supply Chains

The complexity and changing nature of SCs has been discussed above. Rather than trying to achieve a single best SC that is optimised for every occurrence, the evolutionary nature of SCs necessitates a more flexible approach (Gattorna 2009). The notion of uni-directional, linear SCs has changed significantly over the last decades. Reverse logistics and closed-loop SCs are gaining importance as the rate of returns from e-commerce purchases rises and disposal or recycling of products creates additional flows of goods from customers (Guide 2000, Alvarez-Gil et al. 2007, Mollenkopf et al. 2007, Pochampally and Gupta 2008, Guide and Van Wassenhove 2009). Furthermore, a stronger focus on service SCs has revealed bidirectional interactions with both customers and suppliers (Sampson 2000, Maull et al. 2012), thus demonstrating that increasing numbers of SCs are not adhering to the unidirectional model. As the business environment becomes increasingly vulnerable, SCs need to exhibit higher levels of flexibility, not merely in reacting to fluctuating demand, but also in adapting their structures to changes in their wider operating context (Christopher 2005). Uncertainty, fluctuating organisational structures, and the need to accommodate a range of differing and often conflicting demands from stakeholders have become features of many SCs (Day et al. 2012). As both uncertainty and risks in the SC increase, SCs have to become more anticipatory, recognising that they are surrounded by layers of firm, industry, and even macro-environmental volatility leading to fundamental *"instabilities of unprecedented amplitude, frequency, and duration"* (Harrington et al. 2011, p.4).

Despite this focus on flexibility and the notion that standard SC types such as lean and agile are insufficient to comprehend the reality facing organisations and their SCs, much of the growing body of SC management literature concentrates on SCs with mature attributes, such as stable organisational structures, a certain level of predictability, and agreement on the aims of a SC, as well as the acceptable ways of achieving those aims. SCs with less mature operating characteristics receive less attention. As business environments are becoming increasingly more complex, volatile, uncertain, and ambiguous (Bennett and Lemoine 2014, Stevens and Johnson 2016), such SCs will only gain in importance. This thesis contributes to a body of work on

such SCs, building upon notions of dynamic SCs (Gattorna 2006, Gattorna 2009), SC ecosystems (Viswanadham and Samvedi 2013, Millar 2015), SC 2.0 (Christopher and Holweg 2011), or X-SCM (Harrington et al. 2011), the latter term noting in a particularly striking manner the extreme challenges modern SCs encounter. To highlight the fact that such SCs do not fit comfortably within the accustomed frameworks of functional/responsive, lean/agile, or even lean/agile/leagile, this thesis adopts the term non-standard SCs.

2.2.3 Complex Adaptive Systems

As demonstrated in the previous discussion, interactions in modern SCs exhibit a much higher complexity than merely linear causality where an effect can be directly related to one cause, but rather a network of interacting variables, thus making them systems according to the literature of systems thinking (von Bertalanffy 1968, Emery 1969, Checkland 1981, Checkland 1983). Indeed, the added complexity that arises from spatially and temporally separating cause and effect along a SC with a multitude of actors has been noted as necessitating a good understanding of the interdependencies and causal relationships in SCs (Holmberg 2000). Systems thinking offers a way to describe and analyse such complex problems, an enables communication of them and has thus been utilised in operations research and SC and logistics management (Checkland 1983, Holmberg 2000, Rigby et al. 2000, Sterman 2000).

Systems thinking has been applied to SC research since Jay Forrester's work in 1961 (Mason-Jones and Towill 1999b). The central concept of a system embodies the idea of a set of elements connected together to form a whole that exhibits properties that are different than those of its component parts (Checkland 1981). SC management encompasses this systems thinking approach based on the fundamental understanding that the whole is greater than the sum of its parts (Mentzer et al. 2001, Christopher 2005, Grant et al. 2006, Patel et al. 2013, Ellram and Cooper 2014). Systems thinking focuses on the interactions of the parts of a system (Wiener 1948, Ashby 1963, von Bertalanffy 1968). This thesis employs systems theory and the conceptual framework developed here is based on it, particularly on CAS.

CAS are systems that function without any central control and lack a permanent, fixed structure, but are nonetheless distinguishable from their surroundings, such as ecosystems, immune systems, or cities (Holland 1995). Originally, CAS or complexity theory emerged in the physical sciences (Prigogine and Stengers 1984, Lewin 1993, Kauffman 1995), but were applied to the social sciences almost simultaneously (Kiel

1991, Wheatley 1999). The underlying idea is that CAS mimic living organisms in their ability to organise, to learn, and to evolve (Capra 1996, Lansing 2003). A CAS consists of "*populations of individual adaptive agents whose interactions result in complex non-linear dynamics, the results of which are emergent system phenomena"* (Brownlee 2007). The concept of CAS as self-organising systems is at a very high level of abstraction, transcending academic disciplines and being applied across both natural and social sciences (Levin 1998, Lansing 2003). It has seen use in such diverse fields as mathematics, psychology, anthropology, evolution, ecology, information systems, and business management, although there is no unified theory of CAS (Brownlee 2007).

It is challenging to study CAS by conventional means, as it is impossible to study parts of the system in isolation and still retain a sense of the overall functionality of the CAS. CAS are also highly dependent on their history, thus making it difficult to compare and forecast (Holland 1995). This is in sharp contrast to the mechanistic approach of Taylorism and related schools of thought that dominated much of early management philosophies, which aim to subdivide and manage individual parts to approach the whole of an organisation (Dooley 1997). Instead, the CAS approach sits within the domain of systems thinking, which has been developing since the 1940s and is centred around the idea of interactions between parts of a system (Wiener 1948, Ashby 1963, von Bertalanffy 1968), leading scientists in the field of management to see organisations as quasi-organisms (Morgan 1986). With the focus on a collective of interacting adaptive agents in CAS, a reductionist approach is not feasible, as it would over-simplify the inherent complexity of such systems (Gell-Mann 1994). In CAS, as well as in systems thinking as a whole, the whole is always more than the sum of its parts, as interactions play a key role in determining overall functionality and ability to adapt to changes.

In the preceding discussion of SC types and in particular of non-standard SCs, interconnectedness of individual elements within a SC and the ability to react flexibly to changes played a key role in modern SCs. The concept of CAS thus appeals as an underlying idea for the study of such SCs. Individual organisations within a SC can all be seen as interacting adaptive agents that are united in a common purpose if following the alignment demanded in literature (Lee 2004, Christopher 2005). While a fixed and somewhat permanent structure and centralised control might be desirable in some SCs, others, such as the aforementioned non-standard SCs cannot achieve this and, due to the high uncertainty they face, would probably be ill served by such a structure as it is likely to be established at the expense of their flexibility.

Indeed, CAS have been applied in the study of SCs, regarding them as *"a collection of firms that seek to maximize their individual profit and livelihood by exchanging information, products, and services with one another"* (Choi et al. 2001, p. 365) and stressing that interactions between adjacent firms determine the level of control of the system exhibited by any one firm and the behaviour of the SC as a whole, while remaining emergent, dynamic and unpredictable. Employing the established theory of CAS is regarded as a major step towards understanding how highly-complex modern SCs can be governed and how adaptive, flexible and coherent collective behaviour can be coordinated (Surana et al. 2005). The key elements of a SC in terms of CAS are (Day, 2014):

- *Entities:* Decision-making organisations within the CAS that exhibit dynamic learning based on information obtained through their relationships.
- *Topology:* The network created by connections between organisations, including the flow of resources, finance, and information, as well as decisions made.
- *Environment:* The broader context in which entities, topology, and the system as a whole exist, and which affects them.
- *System:* Emergent from the interactions between entities within the CAS, but also interactions with the environment, displays system behaviours.

Research indicates that interactions with the environment, as well as path dependencies within the system are crucial in determining how CAS SCs evolve over time and respond to changes (Pathak et al. 2009). A CAS view of SCs conforms with the earlier discussion of modern SCs and the challenges they face, as the role of the overall business environment and the alignment of SC partners is highlighted.

It is primarily the connectivity amongst entities that determines the topology of the overall SC (Day 2014). However, there is an inherent dichotomy of cooperation and competition as each entity seeks to maximise their individual profit (Surana et al. 2005). While it may seem counterintuitive, such competition is actually regarded as positive in the context of CAS as it aids the creation of emergent and highly dynamic new solutions within the system (Choi et al. 2001). Such dynamic change is to be embraced, as it can increase the resilience of the CAS SC (Pathak et al. 2007, Pathak et al. 2009, Day 2014) through the development of new, shorter paths within the system (Strogatz 2001), as well as higher levels of path redundancy (Albert 2005). Viewing SCs as a CAS therefore requires some level of trust in the properties of the system rather than immediate interference through control measures. While managers should control the

course of action towards overall goals, their key role in a SC CAS is to observe emergent issues and to make flexible and dynamic changes accordingly (Choi et al. 2001).

From a research perspective, CAS provide both guidance for managerial approaches towards a self-organising system without central control, and the opportunity to model SCs using insights from a wide range of fields that study complexity, thus bundling expertise and learning to enhance understanding of SCs that display such a high level of complexity that they are difficult to grasp with standard problem solving methodologies (Pathak et al. 2007, Pathak et al. 2009). Particular attention should be paid to environmental factors that are regarded as crucial in determining how a particular CAS reacts to inevitable changes (Choi et al. 2001, Pathak et al. 2009).

2.2.4 Wicked and Messy Problems

Complex problems that involve the wider environment and have political and social dimensions beyond their mere technical or operational issues have been called wicked (Rittel and Webber 2007) or messy (Ackoff 1981). Messy problems are *"complex, emergent, interdependent problems spiralling near the edge of chaos"* (Calton and Payne 2003, p. 7). Wicked problems are defined as "*social systems problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing"* (Churchman 1967, p.141). Both concepts stress the complexity of the situations they address and acknowledge that such situations are outside of the limits of rational control (Habermas 1987). Work on wicked and messy problems started in the late 1960s when significant technical problems had been overcome culminating in the moon landing, but the world also faced complex social problems signified by, for example, the civil rights movement in the USA (Skaburskis 2008). Based on these experiences, Rittel and Webber (1973) examined the differences between scientific problems and social problems, thus defining the nature of wicked problems.

Traditionally, problem solving has been a domain of operations research (Simon and Newell 1958, Evans 1997). However, the methods for handling well-structured problems are not seen to be able to adequately address messy problems (Rosenhead 1996, Mingers 2000a). An understanding of different problem types is essential for any attempt to solve messy or wicked problems. Mistaking them for a tame problem, thus

ignoring their inherent complexity, can mask larger issues and undermine any future attempts to identify solutions (King 1993). In fact, wicked problems, once a solution has been implemented, tend to generate virtually unbounded waves of consequences (Rittel and Webber 1973). Roth and Senge (1996) introduced a matrix (Figure 7) that distinguishes problem types according to the complexity characteristics they exhibit.

Tame problems are defined as those in which common values are shared among stakeholders resulting in a clear understanding of right or wrong approaches and solutions, and in which outcomes can be easily and directly linked to actions undertaken (Roth and Senge 1996). Wicked problems are characterised by high behavioural complexity, which signifies a diverse set of values among decision makers and considerable disagreement about assumptions and goals (Hancock 2010). Messy problems exhibit high levels of dynamic complexity, presenting a complex, interdependent set of issues with constantly changing and emerging properties (Calton and Payne 2003). None of their constituent parts can be solved in insolation as they display a high level of systems interaction (Hancock 2010). Wicked messes combine high behavioural complexity with high dynamic complexity. Roth and Senge (1996) define them as *"systems of interlinked problems [that] interact with the misunderstandings, divergent assumptions, and polarised beliefs of different groups"* (p. 95) and highlight the tendency of decision makers to focus on curing symptoms rather than examining underlying causes which stakeholders cannot agree upon.

However, definitions of problem types in the literature are not as clear-cut as the matrix in Figure 7 would suggest. According to Mintzberg et al. (1976) messy problems are non-routine occurrences that exhibit a distinct lack of structure, and Mitroff and Mason (1980) state that they are difficult to understand due to a dearth of factual knowledge and unavailability of data. These criteria conform to the assessment of high dynamic complexity. However, messy problems are also regarded as highly political (Lyles and Mitroff 1980, Baer et al. 2013), as they involve a multitude of stakeholders (Calton and Payne 2003, Ackermann 2011, Beattie et al. 2012), and often have broader societal impacts (Mitroff and Mason 1980, Mitroff et al. 2012). These are all areas that fall under behavioural complexity as the complexity stems from human intervention and behaviour rather than inherent system characteristics. As has been shown in previous sections, complexity in SCs stems from both dynamic complexity, such as high uncertainty, the need for flexibility and agility; as well as behavioural complexity, as the important role of people in the SC has been highlighted as eclipsing that of mere processes and technology. Therefore, wicked messes, the combination of the rhetoric of

messy problems and wicked problems in a type of problem that is high in both dynamic complexity and behavioural complexity, are the most appropriate in a SC context.

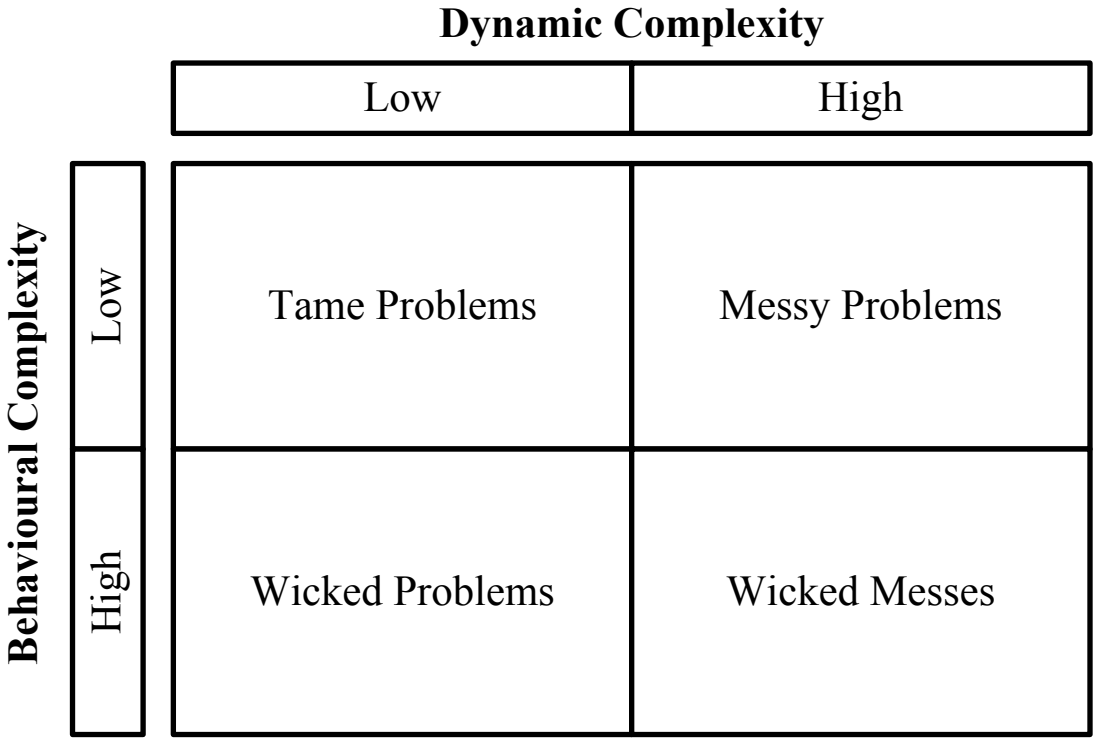


Figure 7: Problem types according to Roth and Senge (1996, p. 93)

While tame problems can usually be solved by adopting a linear style of problem solving, this approach is futile when dealing with other classes of problem, particularly wicked messes (Ritchey 2011). Attempting to address increasingly complex real life problems through applying standard techniques without sufficient regard for a problem's special features or requirements, has resulted in criticism of operations research in particular (Ackoff 1987, Corbett and Van Wassenhove 1993). Since the 1960s, the assumption that all problems are well-defined and adhere to strict criteria for success has been questioned by both academics and practitioners, resulting in the development of various problem structuring methods (Churchman 1967, Ackoff 1979, Checkland 1983). Such methods are concerned with identifying frameworks for a problem, rather than attempting to solve it directly (Rosenhead 1996, Ackermann 2012). Rather than merely seeking to structure complex real-life problems, such methods aim to provide the necessary level of agreement that can then result in agreed upon actions (Eden and Ackermann 2006). The outcome of problem structuring is either a clearly defined problem that can be managed with traditional problem solving techniques, or a situation that has been sufficiently analysed to allow stakeholders to agree upon the future steps to be taken (Rosenhead 1996). Examples of problem structuring

methodologies include Strategic Options Development and Analysis (Rosenhead 1996, Eden and Ackermann 2006, Ackermann 2012), Soft Systems Methodology (Checkland and Scholes 1990, Checkland 1999b), and Strategic Choice Approach (Friend and Jessop 1977, Friend and Hickling 1987).

Wicked and messy problems have been studied in a wide range of fields, such as policy (Mitroff and Mason 1980), corporate social responsibility (Golob et al. 2014), management (Mitroff et al. 2012), and applied economics (Batie 2008). However, the application of these concepts to logistics and SCs remains rare. Ekwall (2012) even argues that normal logistics issues are tame problems according to the definition by Ritchey (2011) as they:

- Have a relatively well-defined and stable problem statement
- Have a definite stopping point, i.e., it is possible to know when a solution is reached.
- Have a solution, which can be objectively evaluated as right or wrong.
- Belong to a class of similar problems, which can be solved in a similar manner.
- Have solutions, which can be tried and abandoned.

Such characteristics are contrary to the current discussion on the complexity of SCs. For example, central control in SC networks has often been abandoned in favour of clusters (Stevens and Johnson 2016). Ekwall (2012) himself goes on to study threats from crime in a SC as an example of a wicked problem. In other studies, sustainable SC management is described as a classic messy problem, as it lacks coherence and possesses a large social and political component (Peterson 2009, Alexander et al. 2014). Tatham and Houghton (2011) note that HL fulfils all the characteristics of a wicked problem.

2.2.5 A Conceptual Framework for Non-Standard Supply Chains

In this section, the first research objective is addressed by developing a conceptual framework for management of non-standard SCs. This builds upon the previous discussion, combining an understanding of SC and logistics management with the study of wicked and messy problems, as well as CAS. This study focuses on a particular type of SC that is non-linear, highly complex and has a significant impact on stakeholders and society as a whole, a SC that present "wicked" (Rittel and Webber 1973) and "messy" problems (Ackoff 1981) and shall therefore be called a “messy supply chain”

(MSC). With no clear and consistent differentiation evident between the concepts of wicked and messy problems in the extant literature, MSC are stipulated to encompass the aspects commonly attributed to both wicked and messy problems. This corresponds to the "wicked messes" depicted in Figure 7, combining aspects of both behavioural and dynamic complexity.

According to Ackoff (1981), messy problems consist of multiple, interlinked problems that add to their overall complexity. This is reminiscence of the structure of a SC that links various entities and depends upon the relationships between them for overall success (Choi et al. 2001, Surana et al. 2005, Pathak et al. 2007, Day 2014). Furthermore, messy problems lack structure and are usually non-routine occurrences (Mintzberg et al. 1976), which bears a resemblance to SCs that operate under high uncertainty and need to display extraordinary levels of agility (Mason-Jones and Towill 1999a, Christopher 2000, Rigby et al. 2000). The problems are often based on assumptions rather than known fact and cannot be solved easily based on knowledge gathered in solving previous problems (Mitroff and Mason 1980). Messy problems are particularly common where societal issues are involved in scientific problems, making ethics an important concern (Calton and Payne 2003, Camillus 2008). The difficulties in actually formulating a messy problem make them even more political (Lyles and Mitroff 1980, Baer et al. 2013). This applies to both the background of messy problems, and the quest for potential solutions. Messy problems deal with broad issues that have a significant impact on society (Mitroff and Mason 1980).

A multitude of different parties are involved in messy problems (Beattie et al. 2012). These stakeholders, with their distinct identities and complex relationships contribute to the messiness (Calton and Payne 2003, Ackermann 2012). As the importance of people within the SC has become more widely acknowledged (Quinn 2004, Quinn 2011), stakeholder management in SCs is also gaining traction (González-Benito and González-Benito 2006, O'Gorman and Pirner 2006, Co and Barro 2009, Lavassani and Movahedi 2010, Park-Poaps and Rees 2010). Prior knowledge is only of limited use when solving messy problems, due to their non-routine and often unique nature. Therefore, it is even more important to approach such problems from a variety of angles (Wagner 1995), enabling collective learning through stakeholder involvement (Calton and Payne 2003). As messy problems are not clearly defined and have broad boundaries (Lyles 2014), they are difficult or even impossible to quantify and therefore present a challenge to computer-based decision support, as well as problem-solving techniques (Wagner 1995). Similar arguments have been made about employing CAS in

SC research (Choi et al. 2001, Surana et al. 2005, Pathak et al. 2007, Day 2014). Generally, inflexibility and excessive structure become an issue when dealing with messy problems (Lyles 2014). The numerous variables they encapsulate often result in attempts to simplify messy problems.

The proposed conceptual framework takes aspects of wicked and messy problems and rephrases them in a SC context, following the tradition of CAS that encompasses similar issues (Choi et al. 2001, Surana et al. 2005, Pathak et al. 2007, Pathak et al. 2009, Day 2014). CAS provides the background to the conceptual framework proposed here. Applying the concepts of wicked and messy problems, as well as the tradition of CAS to SCs, characteristics for MSCs are defined as follows:

1. They present complex, interdependent sets of problems that cannot be adequately addressed through reductionist approaches (Ackoff 1981, Calton and Payne 2003, Mingers 2006b)
2. They have significant sociopolitical impact on their environment, and in turn the environment has a significant sociopolitical impact on them (Mintzberg et al. 1976, Mitroff and Mason 1980, Camillus 2008)
3. They are non-routine operations, characterised by high uncertainty conditions necessitating flexibility (Lyles and Mitroff 1980, Calton and Payne 2003, Camillus 2008, Baer et al. 2013)
4. They have a multitude of stakeholders with differing sets of values, lacking a unified goal or centralised control (Wagner 1995, Ackermann 2012, Beattie et al. 2012)
5. They lack optimal solutions derived from quantifiable evaluation, as there are no clear and quantifiable specifications (Wagner 1995, Eisenhardt 2000, Carrithers et al. 2008, Lyles 2014)

These criteria apply individually to a multitude of SCs. For example, socio-political aspects in SCs can be concerns about carbon emissions or corporate social responsibility (Simpson et al. 2007, Anner 2012, Cruz 2013). Non-routine operations are transient SCs that are quickly formed for a specific purpose, but change dynamically and can be disbanded quickly (Day et al. 2012); an example could be the SCs for the Olympic Games (Horn 2012). A multitude of stakeholders can be linked to socio-political concerns (Buysse and Verbeke 2005, González-Benito and González-Benito 2006), with both being common concerns in many global SCs, but particularly in service SCs (Maull et al. 2012). While one or more of the five characteristics may occur in various types of SCs, a MSC is here defined as a SC that contains all five of them.

However, this does not preclude certain characteristics from being more prominent than others. While, for the time being, the five characteristics are assumed to be of equal importance, this will have to be explored through primary research.

The five characteristics identified are depicted in Figure 8 according to the systems complexity and the behavioural complexity they signify. Their descriptors have been shortened for the sake of simplicity and readability. *Complexity and Interdependency* as the central part of the framework is connected to all four of the other elements, as each of these links into the overall complexity of MSCs. *Complexity and Interdependency* is a common feature in wicked and messy problems, as well as CAS, all of which are impossible to adequately understand through reductionism as the individual parts do not have the same properties as the whole. The two dynamic complexity aspects of the framework are also directly linked, as are the two behavioural complexity aspects. Each grouping represents similar and strongly linked aspects of the MSC. *Non-Routine Operations* occur because there are *No Clear and Quantifiable Specifications,* and in turn the lack of routine has an impact on the ability to collect adequate data on the MSC. The *Multitude of Diverse Stakeholder Views* has a strong political undertone, while *Sociopolitical Impact* in turn feeds into aspects of stakeholder management in the MSC. In the following, this conceptual framework will be explored in the context of HL, first by tracing the five characteristics in the extant literature, and, if that step should indicate that HL might be a suitable MSC context, through further primary research. Each of the five characteristics of the proposed conceptual framework is a postulated generative mechanism underlying the "messiness" of SCs.

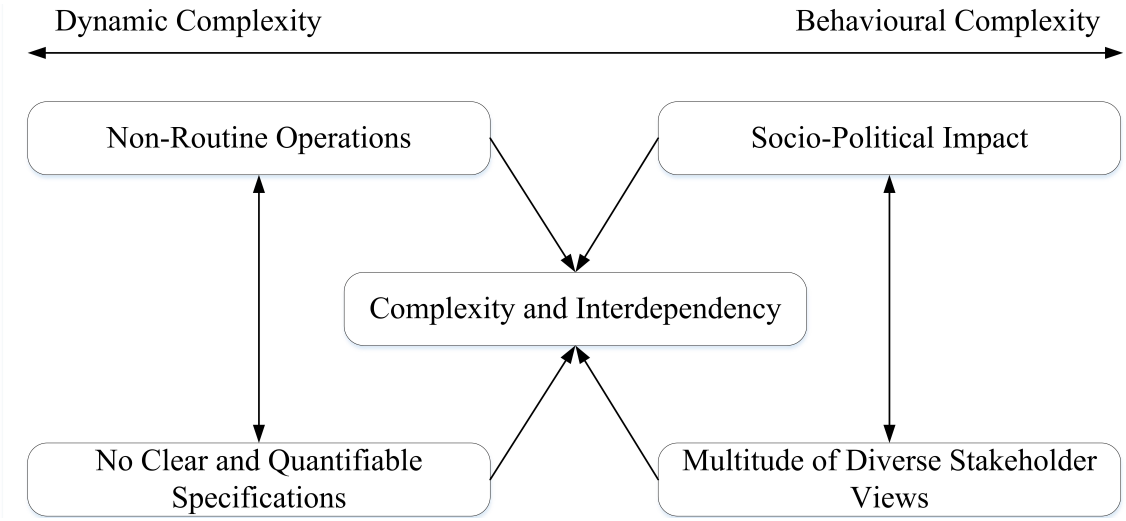


Figure 8: A conceptual framework for messy supply chains (author's own figure)

2.3 The Operational Environment of Humanitarian Logistics

One potential context within which non-standard SCs could occur is the area of HL. This section of the literature review chapter introduces the operational environment of HL to illustrate the complexities faced by practitioners. First, different types of disasters and their impact on HL are discussed. Then, operations within humanitarian responses are detailed. Finally, key actors within the humanitarian SC are introduced and their specific roles and motivations discussed. This is of particular importance given the critical realist approach taken to data collection and analysis in this thesis and the importance of individual worldviews within that school of thought.

2.3.1 Disaster Classifications

HL efforts are focused on disasters (Day et al. 2012, Haavisto et al. 2016). However, no universally accepted definition of a disaster exists, as numerous academic disciplines and practitioner groups approach disasters from a range of angles and for very different reasons (Shaluf et al. 2003). Even though HL is a relatively new research area, there is a rich research history in humanitarian relief efforts from academic disciplines as diverse as medicine, earth science and computer science (Day et al. 2012). The same event might be called an incident, an accident, a disaster, a tragedy, a massacre or even genocide, depending on which party is being asked (Shaluf et al. 2003). In his seminal paper on HL, Van Wassenhove (2006, p.476) defines a disaster as *"a disruption that physically affects a system as a whole and threatens its priorities and goals"*. A major disaster overwhelms the established structures within a region or even a nation, so that they cannot cope with the effects of the disaster on their own (Kovács and Spens 2009, Day et al. 2012).

Classification is imperative because the particular challenges to HL can often be deduced from the kind of disaster that is being faced (Kovács and Spens 2009). The range of disasters is substantial, as the need for HL arises from more than just natural disasters, with the majority of humanitarian responses in recent years focussed on violent conflict or major diseases (Haavisto et al. 2016). The criteria to classify an event as a disaster are commonly quantitative and concentrated on the consequences, such as measures of the number of fatalities, injuries, displaced or deprived people, or the monetary damage (Shaluf et al. 2003). For example, Em-Dat, the international disaster database maintained by the Centre for Research on the Epidemiology of Disasters, only includes disasters that fulfil at least one of the following criteria (Guha-Sapir et al. 2012, 'Disaster Profiles' 2015):

- 10 or more people reported killed;
- 100 or more people reported affected;
- Declaration of a state of emergency;
- Call for international assistance.

The HL challenges will be different depending on the size of the disaster as quantified by the first two criteria listed above. Within this thesis, the Em-Dat criteria are considered to be encompassing all disasters that could potentially result in an MSC. No disaster that does not meet the Em-Dat criteria shall be considered.

Causes of Disasters

There are various types of disasters. A common approach to differentiation is to distinguish by cause. Essentially, disasters can be (Wijkman and Timberlake 1984, Duffield 1994, Shaluf et al. 2003, Shaluf 2007):

- Natural,
- Man-made or
- Complex.

This distinction was established gradually, as the recognition developed that disasters were not merely the unpredictable outcomes of the acts of powerful forces; and the social aspects of disaster causes were first being recognised in the early 1980s (McEntire 2004). Now this classification provides a way to monitor the development over time of different causes, as well as potential prevention strategies and the development of targeted responses according to the type of disaster.

Man-made disasters result directly from human decisions (Wijkman and Timberlake 1984, Shaluf 2007). They can further be subdivided into technological disasters, transport failures, other public place failures, production failures or warfare (Shaluf 2007). The inclusion of warfare as a man-made disaster is controversial, primarily because many humanitarian organisations will not get involved while the fighting continues (Van Wassenhove 2006). Their approach depends on the mission of the organisation, as there are others who are working specifically in war-torn regions. In warfare and certain other man-made disasters, security is a key concern for logisticians (Pettit and Beresford 2005, Haavisto et al. 2016).

In recent years, an increasing amount of humanitarian responses occur in wars and violent conflicts that often escalate into complex emergencies, with one disaster often cascading into multiple others (Haavisto et al. 2016). Complex emergencies are often ones that are inter-related and compounded, such as wars causing a refugee crisis that

then turns a drought into a famine and pose severe challenges to the humanitarian system (Duffield 1994, Kovács and Spens 2009, Day et al. 2012). The complexity makes them difficult to manage, as causes and effects are often impossible to assess. Natural disasters are beyond human control and can be either biological, meteorological/hydrological, topographical or internal, that is from below the earth's surface (Shaluf 2007).

Onset of Disasters

The speed of onset of a disaster is another important factor for classification, which is of particular importance in a HL context as it defines the amount of pre-planning and needs assessment that can be done to remove uncertainties about demand (Pettit and Beresford 2005, Tatham and Kovács 2007, Kovács and Spens 2009). The differentiation is made between sudden-onset and slow-onset disasters, although there are no definite guidelines for the distinction (Twigg 2004). In terms of HL, it has been argued that an agile SC should be used to shorten response times in sudden-onset disasters while a lean SC can provide more cost effective relief in slow-onset disasters (Oloruntoba and Gray 2006, Charles et al. 2010). Furthermore, sudden-onset disasters in particular are likely to destroy essential physical infrastructure such as bridges and air fields (Kovács and Spens 2009).

Location of Disasters

Apte (2009) presents another way of classifying disasters, by also using the time dimension (slow-onset and sudden-onset), but adding a location dimension (localised and dispersed). According to the author, localised, slow-onset disasters present the lowest level of difficulty for HL. The difficulty increases as a larger geographical area and more administrative districts are involved in a disaster, thus widening the spread and adding complexity in coordinating relief efforts (Salmeron and Apte 2010, Apte and Yoho 2011). The required SCs can be expected to be most complex in dispersed, sudden-onset disasters.

2.3.2 Phases of Humanitarian Responses

The onset of a disaster, whether it is slow or sudden, ordinarily serves as the trigger for a humanitarian emergency response. Nevertheless, humanitarian efforts do not ineludibly end instantaneously after the emergency response, but often merge into long-term efforts of recovery and rebuilding (Day et al. 2012, Oloruntoba and Kovács

2015). The various stages of humanitarian responses are unvaryingly interconnected (McEntire 2004). More than 80 years ago, Carr (1932) highlighted that disaster phases are not merely to be seen as discreet events and none can be assumed to represent the whole disaster nor the response to it. Therefore, researchers commonly refer to a set of different, yet interrelated phases of disasters and the humanitarian operations in reaction to them. The identification of disaster phases permits researchers to systemise their work and practitioners to organise and improve their activities within a discrete framework (Neal 1997). A systematic literature review on disaster management showed that almost three quarters of the analysed papers took particular account of the various phases of disasters (Lettieri et al. 2009). In HL, each phase presents different challenges and a changed working environment.

The disaster phases were first described by Carr (1932) and the classification has only changed marginally since then (Neal 1997, Haavisto et al. 2016). However, as many scholars from diverse fields have studied disasters over the intervening decades, there are a variety of terms used to describe each of the stages. Kovács and Spens (2009) highlight the multitude of disaster phase definitions in the literature and conclude that they all form a cycle from long-term reconstruction and rehabilitation to learning and preparedness in order to react better to the next immediate relief phase. However, reconstruction and rehabilitation can also be regarded as the start of developmental aid, rather than disaster relief. Van Wassenhove (2006) describes the stages as follows:

- *Mitigation:* e.g. avoiding disaster-prone regions, using protective equipment
- *Preparedness:* e.g. educating locals about the risks and the right responses, employing early warning systems, pre-positioning of supplies
- *Response:* i.e. providing immediate disaster relief
- *Rehabilitation:* i.e. rebuilding and improving affected communities

Mitigation and response are the phases most commonly discussed within the academic literature, thus demonstrating limited research efforts focussing on the more strategic phases of the cycle (Long 1997, Lettieri et al. 2009). Occasionally, the mitigation phase is completely omitted in research (Long 1997, Lee and Zbinden 2003, Kovács and Spens 2007). This is a significant oversight with potentially serious consequences for humanitarian operations worldwide as long-term planning and development play a major role in disaster prevention (Wijkman and Timberlake 1984).

Maon et al. (2009) developed a dual cycle model of disaster relief operations. The first cycle consists of reaction and recovery, while the second, the more strategic one, focuses on prevention and planning. A simplified version is shown in Figure 9. This model illustrates the importance of planning in humanitarian missions. Planning is an essential part that cannot be skipped and that has a major impact on the eventual humanitarian response to a disaster. Early consideration of the long-term recovery can avoid waste in immediate response and prevent "aid addiction" in the rehabilitation (Regnier et al. 2008). Disaster management has to take into consideration all the different phases. HL spans all of the phases and could, therefore, play a major role in addressing strategic concerns.

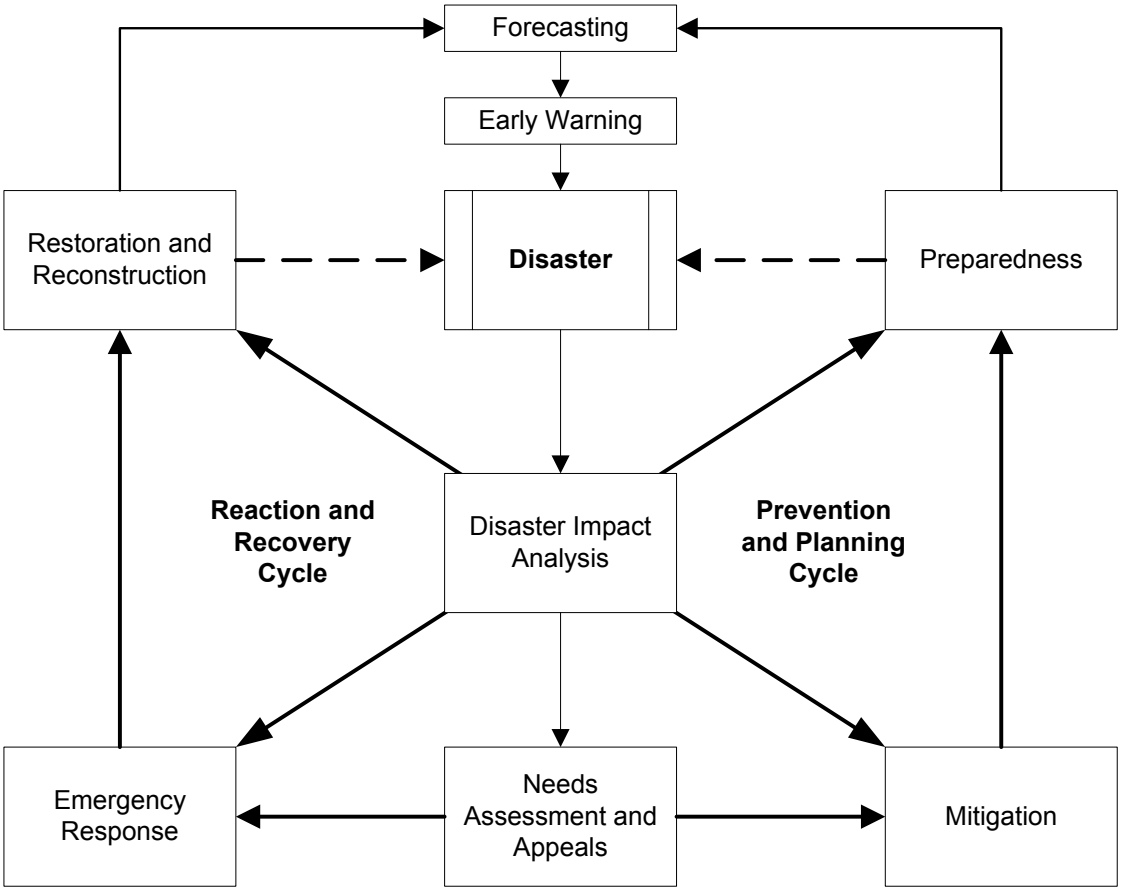


Figure 9: A Dual Cycle Model of Disaster Relief Operations, adapted from (Maon et al. 2009)

Some humanitarian organisations will only engage in certain stages of a disaster response, with certain ones focussing on recovery, while others solely provide immediate relief. For instance, the Food and Agricultural Organisation (FAO) focuses on recovery and long-term food programmes, while the World Food Programme (WFP) provides food in acute disaster situations, thus even though both organisations emphasise food products, they differ in the phases of a humanitarian response that they

operate in (Kovács and Spens 2009). Emergency response and longer-term developmental work differ significantly in the demands they place upon operations and the expectations for HL, requiring different skills and approaches. However, emergency response and developmental work are linked and often occur in similar localities, at times exacerbating each other with unsustainable development causing disasters, as well as disasters setting back development efforts (McEntire 2004). Humanitarian relief and developmental aid are therefore a continuum. The actual work might be divided between different organisations, but the two are invariably interlinked, particularly in poor, structurally vulnerable regions (Regnier et al. 2008).

The interconnectedness of various phases creates challenges for HL, as the two types of humanitarian responses have very different logistical needs. In the immediate emergency response, a humanitarian SC has to be established quickly, at least within the targeted disaster area, forming new structures that might be disbanded again just as quickly, but the longer-term developmental missions require more permanent structures (Day et al. 2012). The phase of a disaster can influence such aspects as the transport modes being used in HL. For example, a switch from air to road can signal the shift from disaster relief to recovery (Tatham and Kovács 2007, Kovács and Spens 2009). Overall approaches to logistics and SC operations are also likely to be different. While flexibility and agility is essential in emergency responses (Beamon and Balcik 2008, Chandes and Pache 2010), a lean SC can provide cost effective support in developmental responses (Oloruntoba and Gray 2006, Charles et al. 2010).

2.3.3 Organisations in Humanitarian Logistics

The humanitarian sector is a large, global one. All governments globally are involved in humanitarian relief, as beneficiaries, donors or both (Kovács and Spens 2007). Therefore, it is not surprising that there is a multitude of organisations involved in the administration of humanitarian relief. It is estimated that the developed western nations alone are home to about 4,000 international non-governmental organisations (Tatham and Spens 2011). The assembly of organisations that react to a particular disaster will be different every time, as the SCs form spontaneously (Day et al. 2012). This results in a highly complex and dynamic system of interactions between organisations. A brief overview of the various types of players involved in HL will be given.

Non-profit organisations mainly differ from for-profit ones in their revenue sources, their goals, their multitude of stakeholders and their difficulty with

performance measurement (Beamon and Balcik 2008). Revenue sources and goals are customarily set out in an organisation's mandate. Funding might originate from private, corporate or governmental sources, through donations or through more commercial activities. The goals set out in the mandate also influence the number and spread of stakeholders. Three different types of international humanitarian organisations can be distinguished (Thomas and Kopczak 2005):

- United Nations (UN) entities such as the World Health Organisation (WHO) or the United Nations High Commissioner for Refugees (UNHCR)
- International Organisations, which maintain offices around the world that are affiliated with national governments
- International Non-governmental organisations (NGOs) that are not affiliated with governments

Another way to differentiate between types of organisations is by their motivations for aid (Stoddard 2003):

- Commercial Organisations: Have a financial interest in their participation in humanitarian work
- Faith-based Organisations: Conduct charitable work based upon a religious imperative
- Dunantist Organisations: Follow the tradition of Henri Dunant and governed by humanitarian principles these organisations have a focus on long-term impact and are independent of or even adversarial to governments
- Wilsonian: Following the tradition of Woodrow Wilson, these organisations are cooperative with and often dependent on governments, adopt a pragmatist view of aid, often focussing on immediate aid, which might be distributed according to certain values

An organisation's ability to respond to a particular disaster will, among other factors, depend upon its structure. Organisations with a presence in the affected country can provide relief immediately, while others need to wait to be officially invited to enter (Kovács and Spens 2009). The latter category includes all UN organisations as they are by definition without a permanent local presence. There is no clear, universal structure of command among humanitarian organisations, which complicates inter-organisational HL. Although the UN has a certain leadership role, it depends on a request for aid from the government of any affected nation, and at any rate, organisations have to work closely with local governmental structures (Day et al. 2012). This gives different

advantages and challenges to each of the aforementioned types of organisations. In addition to international players, there may also be local or national humanitarian NGOs involved in any humanitarian efforts. The SC techniques that can be employed depend mainly on the balance of existing structures in or close to the disaster area, and those around the globe that might facilitate a timely response.

Disasters that are in the media attract a high level of public attention. Often this coverage results in uninvited and unexpected individuals or organisations with very little experience or competence for cooperation making their way into disaster areas in order to help, frequently complicating coordination efforts (Day et al. 2012). Humanitarian NGOs are very diverse and some may have doubtful quality standards, ranging from those who do not truly abide by humanitarian principles, but seek to profit from humanitarian activities, to well-intentioned individuals without any expertise in the field (Hilhorst 2002). One of the key areas smaller, non-established organisations struggle with is HL, but even within experienced organisations HL is challenging. The recognition of the importance of HL is highest among large, multinational agencies (Thomas and Kopczak 2005). The size of an organisation and its experience are an important variable in its HL capabilities.

NGOs do not have a specific mandate given to them by states or other external bodies, but derive their legitimacy from operating in accordance with legislation, potentially being recognised as NGOs under Art. 71 of the UN Charter, and by being an enactor of human rights (Slim 2002, United Nations 2012). This international legitimisation provides some guidance and structure, but might also be seen as patronising and favouring larger, better-known NGOs. However, on a national or local level, deriving legitimacy from governmental structures is difficult in many disasters, as the affected states are often not effective or legitimate themselves (Hilhorst 2002). Another type of legitimacy is the moral justification that an NGO derives from its mandate (Slim 2002, Pérouse de Montclos 2012). The mandate plays an important role in the legitimacy of an organisation, as well as its strategic direction and operational consequences.

The mandate of an organisation typically defines the items it delivers, the beneficiaries catered for, as well as the types and the phases of disasters it engages in, as well as potential cooperation partners (Kovács and Spens 2009). NGOs can engage with both or either one of immediate relief and long-term rehabilitation activities (Beamon and Balcik 2008). Particularly smaller NGOs tend to focus on niche markets, but there is also specialisation among some of the individual national chapters of larger

organisations, such as within the IFRC where Canada and Denmark focus on logistics while Norway and Finland specialise in field hospitals (Kovács and Spens 2009). Specialisation is attractive to donors, as it allows them to make decisions on how they want their money to be spent by selecting an appropriate charity, but a similar effect can be achieved in larger organisations through earmarked donations (Bilodeau and Slivinski 1997). Figure 10 illustrates the complexity of the funding streams from the different types of donors to the beneficiaries (Thomas and Kopczak 2005). It distinguishes between the aforementioned key types of organizations.

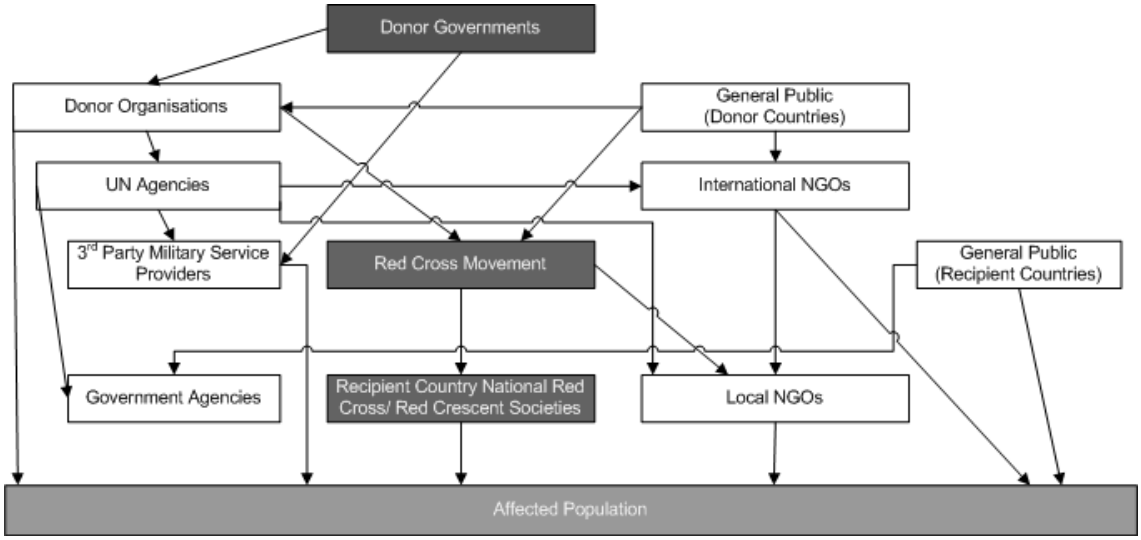


Figure 10: Humanitarian Sector Funding Flows (Thomas and Kopczak 2005, p.4)

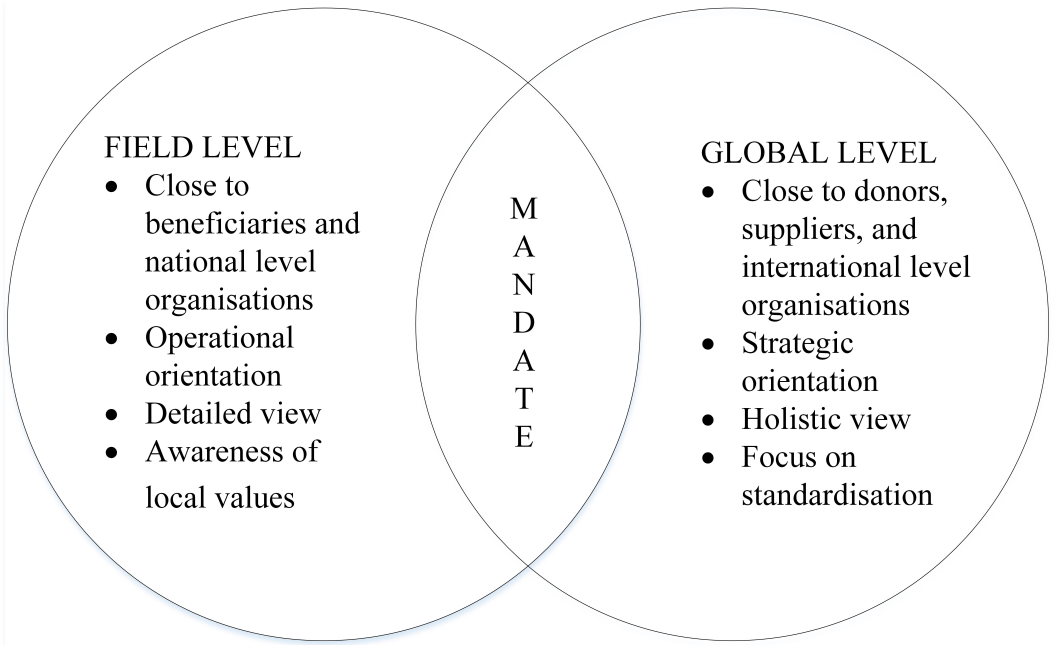
There are UN agencies, government-affiliated organisations and NGOs. Each type faces particular challenges and offers various benefits when setting up a SC. With the wide variety of different organisations in this sector, it is difficult to generalise research findings (Chandes and Pache 2010).

2.3.4 Stakeholders in Humanitarian Logistics

Stakeholders are defined as any group or individual that can affect or are affected by the achievement of an organisation's purpose, and can usually be found outside of that organisation (Freeman 2010). The multitude of stakeholders in the humanitarian sector adds complexity and has an impact on performance, as well as the underlying definition of performance (Hilhorst 2002). It is important to distinguish between the actors who are actively participating in humanitarian missions and the stakeholders who have an interest in them (Tatham and Kovács 2007). Stakeholders who are not actively responsible for a certain phase, function or activity within the humanitarian operation

might also be called actors with an indirect involvement (Lettieri et al. 2009). All these stakeholders have different perspectives on the work of an organisation (Kovács and Spens 2009).

Figure 11 illustrates the key points about internal stakeholders of HL in an NGO. The most obvious divide is that between the field level and the global level. NGOs are often seen as one homogenous body, for example when mapping information flows (Tomasini and Van Wassenhove 2009). However, HL stretches across different departments and levels within any organisation. This is a particularly prominent problem in humanitarian organisations, where HL is all too often still seen as a standalone activity (Moore and Taylor 2011). Properly administered, HL can provide a link between head office and field staff (Thomas and Mizushima 2005). The unifying factor for action and thinking on all levels remains the mandate of a humanitarian organisation, as shown in Figure 11. Nevertheless, potential for disagreements and challenges remains and a few common trouble spots are presented below.



TROUBLE SPOTS

- Little external pressure for accountability or improvement
- SC management is seen as a stand-alone activity and receives little recognition
- The applicability of management theories is doubted
- Lack of trained staff and high staff turnover
- Lack of appropriate equipment and allocation issues
- Missing communication and associated technology
- Complex, informal decision-making processes
- Intercultural difficulties

Figure 11: Internal Stakeholders in HL (author's own figure)

There are significant differences between large international NGOs that can provide broad assistance throughout a wide geographical area and their smaller counterparts who focus on niche markets (Kovács and Spens 2009). If an organisation engages in both immediate response and long-term relief, different parts of it will be responsible for these areas (Kovács and Spens 2007). Communication and coordination within an organisation across the different phases is a main conflict area (Lettieri et al. 2009). HL encompasses various activities within an NGO, stretching across most departments (Thomas and Kopczak 2005). An HL manager has to piece together the various bits of information from across the organisation (Long and Wood 1995). This includes the strategic, as well as the operational level. In most cases, the SC will start at the global level and end at the field level. The local facilities are the key internal customers to the central elements of HL (Oloruntoba and Gray 2009). As the response progresses, more and more responsibility will be shifted to the field level, for example as actual demand becomes more visible.

The internal stakeholder structure is determined by the degree of centralisation an organisation exhibits (Gatignon et al. 2010). The internal structures of NGOs can be described in three different categories depending on their integration with local social networks (Holguín-Veras et al. 2012b):

- *Agency Centric Efforts:* a foreign lead organisation that has no permanent presence or integration locally
- *Collaborative Aid Network:* part of an on-going community effort that is linked to a network of such groups both inside and outside the disaster area
- *Partially Integrated Effort:* has some integration with locals, but does contain a foreign element as well

From an HL perspective, these structures determine whether the internal stakeholders from the field or the global level have a stronger influence. Furthermore, the relationships with external stakeholders might rest with certain internal ones, as particular national offices have established them or are predominantly involved with them, especially in large international organisations (Gatignon et al. 2010). This reliance on social ties often occurs when seeking to establish a more community-based approach that involves beneficiaries directly in aid delivery (Kovács et al. 2010). Different parts of the NGO are closer to certain external stakeholder groups. One of the key roles of personnel in HL is to build relationships with stakeholders (Oloruntoba and Gray 2009, Kovács et al. 2012). This includes the internal, as well as external coordination. A more detailed discussion of external stakeholders is provided as part of

the introduction to the conceptual framework, but Table 1 summarises some potential groups on various levels of HL.

If local parts of the organisation receive instruction from the global headquarters, there is a perception that this may lead to the imposition of Western values and morals, rather than something that is meaningful and participatory at a local level, and that local interests can be under-represented (Hilhorst 2002). It is difficult to counter this development through formal structures, and therefore trust between field workers and superiors is particularly important in HL, as it might be the only mechanism to ensure consistency in otherwise uncontrollable situations (Lettieri et al. 2009, Tatham and Kovács 2010). Team-work is vital in a holistic approach to disasters including teams across functions, phases and levels (Lettieri et al. 2009). Despite this emphasis on togetherness, very few NGOs have democratic structures (Slim 2002).

	International	**National**	**Field**
Humanitarian	UN Other NGOs	Government affiliated offices	Other NGOs
Governmental	Home / donor government	Government	Tribal chieftains
Military	UN Peacekeepers	Government forces	Insurgents
Private	Donors	Donors	Beneficiaries
Commercial	Suppliers Media Logistics Donors	Suppliers Media Logistics Infrastructure providers	

Table 1: Examples of External Stakeholders on International, National and Field Level

As Figure 11 displays, the mandate of an NGO is the area where the field and the global level overlap. All NGOs are bound by their mandate (Kovács and Spens 2009) and the common goal for all internal stakeholders is to aid people's survival out of moral imperatives (Kovács and Spens 2007). As all the members of an NGO pursue

goals set by their mandate, it can be assumed that they rarely actively work against each other (Tatham and Kovács 2010). Nevertheless, decision-making with severely limited transparency and often-misaligned incentives is a common occurrence, adding to an increased complexity compared to commercial operations as decisions are seldom formalised and there is little standardisation (Thomas and Kopczak 2005, Holguín-Veras et al. 2012a).

Kovács and Spens (2009) identified the key issues of HL associated with internal stakeholders as lack of trained logisticians, brain drain, lack of equipment, and lack of communication and associated technology. These are echoed by a literature review on disaster management (Lettieri et al. 2009) and research by the Fritz Institute (Thomas and Kopczak 2005). However, all three of these studies focus mainly on the external stakeholders, which can be attributed both to their higher impact, as well as the relative invisibility of the internal stakeholders.

2.4 Humanitarian Logistics as an Example of Messy Supply Chains

After developing the proposed conceptual framework for MSCs and introducing the operational context of HL, this section of the literature review introduces HL as a potential example of MSCs. First, the research context of HL and the theory development in this area are discussed. Then, the proposed conceptual framework is embedded within this context and each of the five elements of a MSC is traced within the HL literature, giving indications of aspects that could become indicators of MSCs. These findings are summarised in the final part of this section, which proposes HL as an example of MSCs.

2.4.1 The Research Context of Humanitarian Logistics

Major research and managerial interest in HL originated after the 2004 tsunami in South East Asia and the catastrophic logistics failures in its aftermath, starting with operational concerns such as custom clearance and the congestion of ports and airports (Kovács and Spens 2011). Since then, research has developed to address more strategic issues. There is a growing research community that works closely with humanitarian organisations (Tatham et al. 2009). Conference tracks, special editions of journals and, from 2011 onwards an entire journal, have been dedicated to HL (Kovács and Spens 2011). Research in HL is of particular interest for five reasons (Day et al. 2012):

- There is much room for improvement

- The cost of failure both financially and in terms of human suffering is high
- Governments, the military, non-profit organisations, commercial organisations, and private individuals are all involved
- Research carried out within HL can illuminate issues in commercial environments as well
- HL encourage a view beyond just economic perspectives, which seem to be the focus of most SC management research

These reasons give a broad view of HL not as an isolated research area, but as one that combines an academic interest in improving operations with philanthropic desires. A research agenda based on these statements will incorporate knowledge gained in other research areas and reflect not just on HL, but also on commercial SCs (Day et al. 2012).

However, research outputs in HL have been limited both in quantity and in quality. Most publications on HL are conceptual, as there is a distinct lack of empirical research that is both rigorous and relevant (Kovács 2012). Analytical models and other research approaches can help structure and understand HL problems, but researchers have to be careful not to over-simplify what are inherently complex and ill-structured situations, particularly when working without an empirical foundation (Apte 2009). Much research done on HL tends to ignore the complicating factors or distort the situations faced in practice (Day et al. 2012). The uniqueness of each disaster and each humanitarian response or indeed humanitarian organisation, presents any research project with difficulties in achieving generalizable findings. Often, only one off solutions for one organisation or one particular scenario are considered, but the focus should move to findings that can be applied multiple times (Thomas 2004, Chandes and Pache 2010, Kunz and Reiner 2012).

The rigour and relevance of HL research need to be improved in order to increase its outreach (Overstreet et al. 2011, Kovács 2012). Private sector and academic resources and expertise have to be brought together in order to improve HL (Thomas 2004). Bridging the gap between researchers and practitioners is of particular importance in HL, because of the magnitude of potential impact in practice. However, given the scarcity of resources within the sector, access to research results can be a problem. The *Journal of Humanitarian Logistics and Supply Chain Management*, which was first published in 2011, therefore has a policy to make its entire content freely available half a year after publication (Kovács 2012). Academics can and have already

sparked significant debate among HL professionals (Apte 2009). Tatham et al. (2009) outline several important contributions that research can make to HL in practice:

- Provide objective evidence for the need to improve performance
- Develop methodologies for process improvement
- Transfer knowledge from commercial SC management
- Train HL professionals to a high standard
- Increase the profile of HL to managers and donors

All these aspects focus on a more holistic, strategic view that goes beyond a narrow understanding of the logistics function as outlined previously. This thesis strives to support this movement towards a more strategic approach to HL.

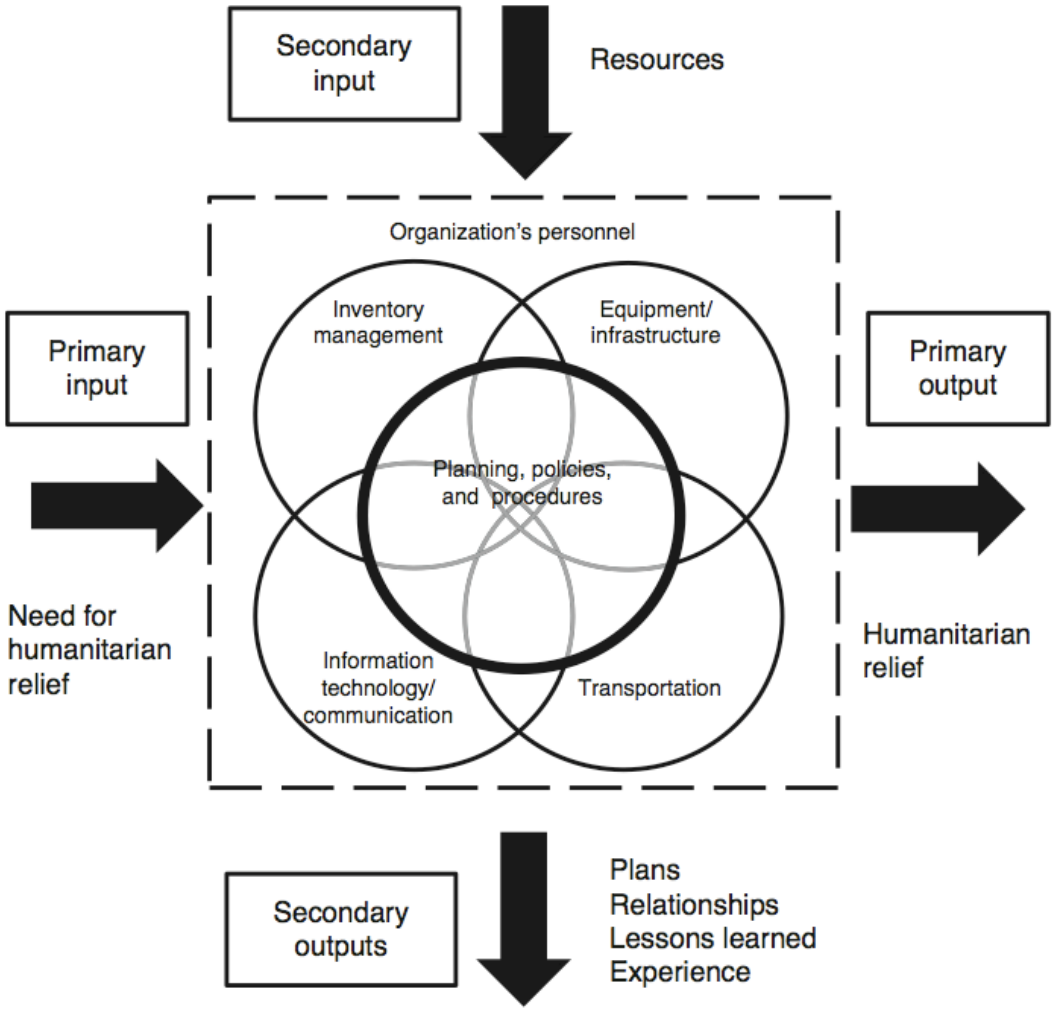


Figure 12: Humanitarian Logistics Research Framework (Overstreet et al. 2011)

While more and more research around HL has been undertaken, there is a lack of coordination and coherence, as there is currently no overarching theoretical framework (Carroll and Neu 2009). Richey (2009) attributes the theoretical shallowness of HL to the urgent need for very practical solutions and the involvement of many different

disciplines in the research. A research framework could improve both the rigour and the relevance of HL research, as it outlines the key elements to be studied (Overstreet et al. 2011). Such a framework is proposed by Overstreet et al. (2011) (see Figure 12). It identifies the boundaries of the system of HL with its primary inputs and outputs, as well as the key aspects in its internal processes. It can be seen as a foundation for future research that attempts to consider HL as a system.

2.4.2 Theory Development in Humanitarian Logistics

To comprehend the requirements and surroundings of HL throughout a crisis, appropriate theories need to be established. Conceptual frameworks can be developed using theory borrowed from related areas, such as SC management (Overstreet et al. 2011). The academic community can aid in the selection and adaptation of appropriate theories from commercial SC management, keeping in mind the unique circumstances that the humanitarian sector faces (Tatham et al. 2009). While many theories from SC management and other related disciplines appear to be relevant, the specific circumstances of HL need to be considered when adapting and utilising them, particularly since HL does not necessarily share the focus on cost reduction that has traditionally been prominent in its commercial counterpart (Jahre et al. 2009).

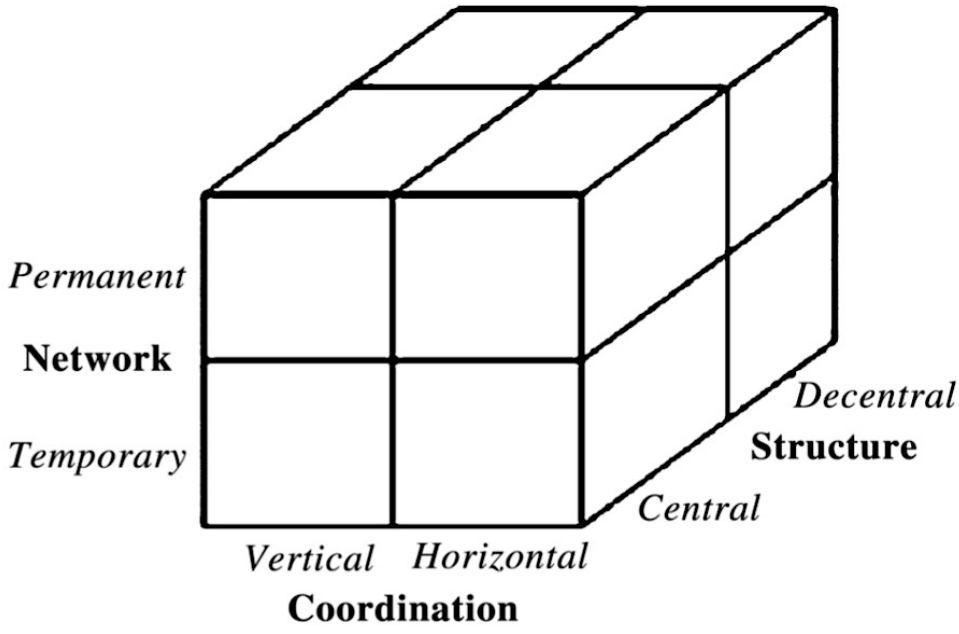


Figure 13: Three dimensions as a basis for theoretical development (Jahre et al. 2009)

Jahre et al. (2009) presented three dimensions as a basis for theory development in HL (Figure 13). They describe the permanent network utilised during the preparation stages versus the temporary network established specifically for each mission; the vertical coordination in reaching out to various areas and the horizontal coordination between different operations; centralisation of structures for easier manageability versus decentralised structures in order to enable quick response. Based on these three main characteristics, the authors list several theories from commercial SC management and other areas of research that can be applied and conclude that the theories around postponement and speculation strategies would be particularly useful to pursue. Generally, these three dimensions of network coordination and structure can help researchers in selecting suitable theories and screening them against some of the key criteria that contribute to the complexity of HL. This should improve the relevance of developed theories to practitioners.

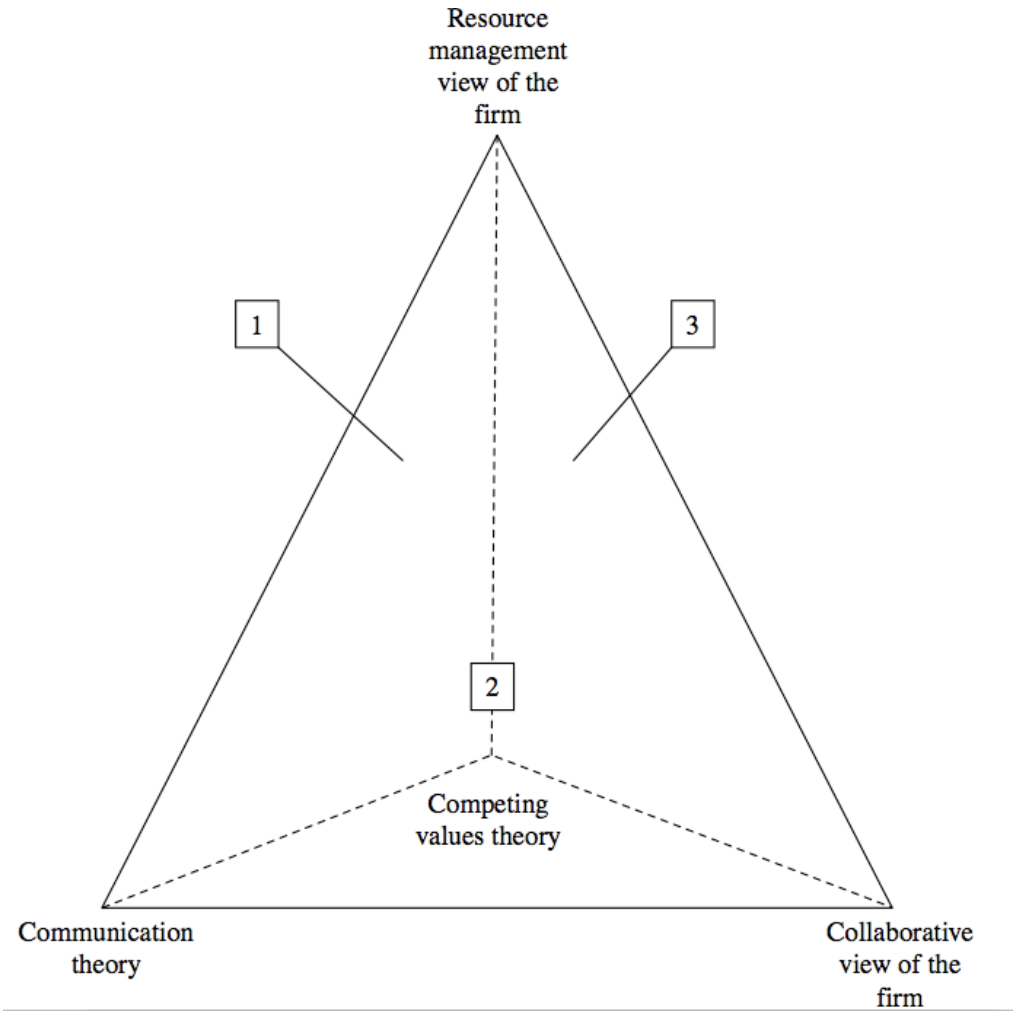


Figure 14: The Disaster Recovery Pyramid (Richey 2009)

In order to assess the relevance of a theory within the context of HL, a researcher needs to determine the cornerstones of the discipline in the context of the posed research question. For example, based on a literature review, Richey (2009) chooses collaboration, communication and contingency planning as the key elements that need to be considered. Therefore, Richey (2009) selects four well-known theoretical perspectives to develop the conceptual framework of the disaster recovery pyramid: the resourced based view of the firm, communication theory, competing values theory and relationship management theory (Figure 14). Section 1 of the framework depicts organisations looking for access to resources based upon their own needs with disrupted communication channels. Section 2 links collaboration and communication with resources that could be provided through the first two elements. Section 3 seeks to balance competition and cooperation to achieve an appropriate resource allocation. While this pyramid cannot be regarded as an end to the discussion of suitable theories for HL, it is definitely a beginning and could encourage other researchers to develop their own models, as appropriate to their research questions.

2.4.3 The Conceptual Framework in Humanitarian Logistics

According to the stages of the research outlined in Chapter 1, a literature review was conducted to establish the concept of MSCs based upon previous publications, and the research context of HL as presented in extant literature was provided. The following sections are going to combine these two aspects and discuss MSCs in HL. Therefore, the second research objective is being addressed, namely the characteristics of non-standard SCs with a particular focus on HL.

It has been suggested that HL presents a "wicked" problem (Tatham and Houghton 2011). Based on literature on "wicked" (Rittel and Webber 2007) or "messy" problems (Ackoff 1981) a conceptual framework has been developed, identifying five "wicked" or "messy" characteristics SCs might exhibit. This work will further the understanding of the aspects of the context of HL that lead to the conditions that influence the relationship between the application of SC knowledge and the outcomes achieved in the context of humanitarian relief.

The remainder of this chapter is dedicated to a review of literature on HL according to the five characteristics of MSCs that have previously been established. Each of the five characteristics is traced in the extant literature, attempting to find evidence of it in the existing body of knowledge. If such evidence can be found, HL might indeed be an MSC environment, thus prompting further empirical research. Each

of the five characteristics of MSCs is discussed in turn, starting with the behavioural complexity half of the framework, then moving on to the central aspect of *Complexity and Interdependency*, and finally concluding with the two characteristics within the dynamic complexity half. If it is possible to establish themes for each of the characteristics, these themes could be used to inform further empirical studies.

It has to be noted that HL represents only one possible context for the MSC framework. As has been noted in earlier parts of this chapter, a rich body of literature has been devoted to non-standard SCs that do not conform to common SC types (Choi et al. 2001, Surana et al. 2005, Gattorna 2006, Pathak et al. 2007, Gattorna 2009, Christopher and Holweg 2011, Harrington et al. 2011). This suggests that such SCs are also widespread in commercial SC operations. Therefore, it is conceivable that MSCs can also be located in other contexts. However, this thesis focuses solely on HL. Further research might afterwards be conducted to establish MSCs in other contexts.

2.4.4 Multitude of Diverse Stakeholder Views

The *Multitude of Diverse Stakeholder Views* forms an aspect of the proposed conceptual framework, exhibiting behavioural complexity. All the stakeholders have different perspectives on the work of an organisation (Kovács and Spens 2009). The wide range of stakeholders and their wildly differing views and objectives make HL increasingly complex and impact on its performance (Hilhorst 2002, Vaillancourt 2016). This is typical of messy situations (Beattie et al. 2012). However, stakeholder involvement can also be essential for problem solving in messy problem situations (Calton and Payne 2003). Important external stakeholder groups will be summarised here. Figure 15 provides an overview of them along a simplified humanitarian SC. The elements of this figure are explained in more detail in the following sections.

The customers in HL are both donors and beneficiaries; the suppliers are both donors and actual paid suppliers (Oloruntoba and Gray 2009, Charles et al. 2010, Schiffling and Piecyk 2014). This is a much more complex structure than is customary within most commercial SCs where suppliers are being paid and customers pay for the good and services they receive. In order to meet the acute needs of an affected population, donors have to relate to beneficiaries, and all stakeholders have to work towards a common goal, which is outlined in broad terms by an organisation's mission or mandate (Oloruntoba and Gray 2009). The number of stakeholders, as well as the complex relationships they have to HL and amongst each other, is a key factor of complexity in HL.

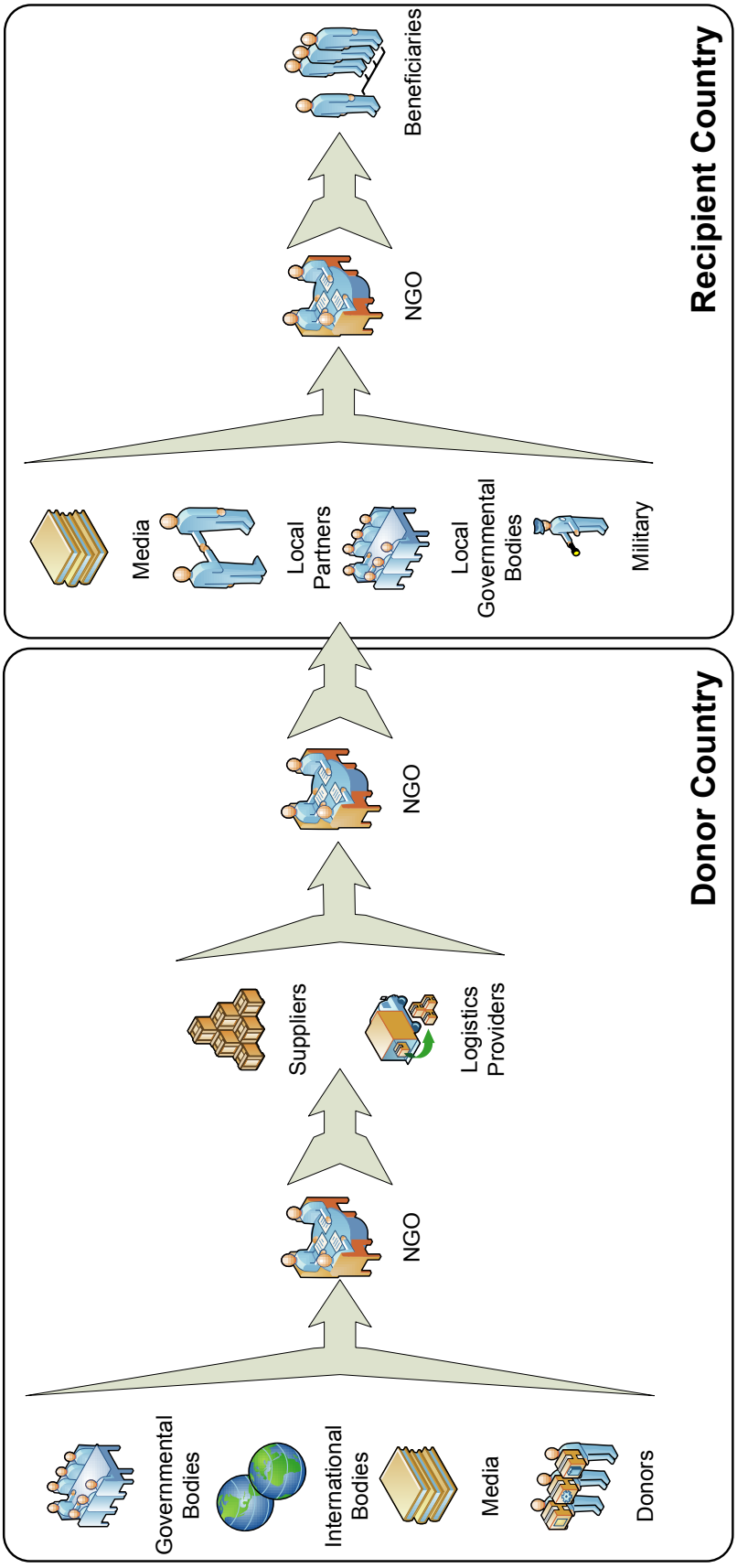


Figure 15: Stakeholders along a simplified humanitarian supply chain (author's own figure)

Relationships with **donors** are crucial in HL, as donors provide or withdraw the financial and material support depending on whether or not their needs and demands are met (Hilhorst 2002, Kovács and Spens 2008). NGOs compete for donations from a limited number of donors that make decisions about the allocation of their resources based upon their assumed or actual knowledge of the activities these resources will be spent on (Bilodeau and Slivinski 1997, Oloruntoba and Gray 2009, Everett and Friesen 2010). This plays a major role in the underlying morals of organisations. For example, religious organisations form the background of many NGOs, and can influence their mandates and potential areas of activities, as well as cooperation (Long and Wood 1995). Donors can be corporate, private or governmental institutions, each with differing demands and needs for transparency and reports, for example for tax purposes, or to appease their shareholders (Raynard 2000, Hilhorst 2002, Everett and Friesen 2010, Harvey et al. 2010, Haavisto and Goentzel 2015).

Relationships with **beneficiaries** are often less clearly defined and less carefully managed, as beneficiaries, particularly in the immediate aftermath of a disaster, have neither much input in HL decisions nor a way to exit this non-contractual relationship (Hilhorst 2002, Pettit and Beresford 2009, Kovács et al. 2010). As recipients of aid, the beneficiaries are important, but often overlooked stakeholders (Oloruntoba and Gray 2006, Sheppard et al. 2013). Nevertheless, their trust is essential to the safety and ultimately success of a mission (Hilhorst 2002, Lettieri et al. 2009). Beneficiaries cannot just be seen as passive stakeholders that have to be fed, sheltered and rescued, as they have at least one active role, that of evaluating the humanitarian response (Lettieri et al. 2009, Kovács et al. 2010). Assessment is usually conducted by the funders or governmental bodies that instruct NGOs, but hardly ever by the beneficiaries (Pérouse de Montclos 2012, Sheppard et al. 2013). Therefore, the donors, who, in SC terms, are suppliers, as well as customers of HL, assess the quality of the end-customer experience.

Governmental bodies are invariably stakeholders of any humanitarian organisation. Many organisations collect donation pledges directly from governments, but every organisation has to work with governmental bodies in some way (Long and Wood 1995, Özpolat et al. 2015, Apte et al. 2016). There is however, no guarantee that governmental bodies keep politics and donations separate. It will depend on an organisation's interpretation of their mandate whether they can accept these politically motivated donations or not.

Humanitarian organisations often share goals and similar philosophies, but at the same time they compete for donations, as well as media attention (Hilhorst 2002, Oloruntoba and Gray 2006, Tatham and Kovács 2010, McLachlin and Larson 2011). Relations between humanitarian organisations are often strained and not cooperative (Long and Wood 1995, Oloruntoba and Gray 2009, Pettit and Beresford 2009). Many organisations remain sceptical towards cooperation or have even made negative experiences (Tatham and Kovács 2010, Pazirandeh and Herlin 2014). There are however some initiatives where NGOs cooperate, for example in the active learning network (ALNAP) which gathers and shares lessons learned from humanitarian operations, or the British Overseas Aid Group which is formed by the five biggest international UK NGOs (Hilhorst 2002, Slim 2002). Rival NGOs can be both a threat and an opportunity to move forward and improve the provision of aid.

Military-humanitarian cooperation has seen a steady rise in recent years, no longer being limited to sudden-onset disasters, but increasingly also in slow-onset ones, sometimes even stretching to active war zones (Cross 2011, Seipel 2011, Heaslip and Barber 2014). Particularly in potentially hazardous situations, military get involved in aid provision as well, for example through the United States Department of Defence's Civil Affairs units (Long and Wood 1995, Oloruntoba and Gray 2006, Kovács and Spens 2008). Particularly in a logistics context, military involvement can be beneficial as existing capacities and expertise are utilised, much of the early development of logistics stemming from the military (Van Crefeld 2004). Military can provide transportation capacities and security; however such interactions may also be seen to compromise the humanitarian principles (Seipel 2011, Heaslip et al. 2012). On the other hand, cooperation with humanitarian organisations is seen critically within the military as well, as the diversity of the humanitarian sector can seem chaotic to military commanders, even though it can provide an important cultural and psychological interface with local populations (Cross 2011, Heaslip and Barber 2014). With the military, there are issues of protecting the humanitarian space by remaining neutral, but at the same time not compromising on security (Tomasini and Van Wassenhove 2009, Heaslip et al. 2012). The most likely scenario for such interactions are sudden-onset, large-scale natural disasters such as earthquakes and tsunamis, where the military's capacities in speedy response are often seen to outweigh the compromise on neutrality and independence (Seipel 2011, Apte et al. 2016).

Stakeholders in HL can also be **commercial organisations**, such as logistics providers and suppliers (Kovács 2008, Balcik et al. 2010, Bealt et al. 2016). Working

with commercial organisations can add resources and expertise to humanitarian missions, particularly in HL (Herlin and Pazirandeh 2012, Abidi et al. 2015). However, these interactions may also compromise the humanitarian principles. Many companies support humanitarian causes for corporate social responsibility reasons, but might also seek to financially profit from them (Balcik et al. 2010, Bealt et al. 2016). There are some successful examples of close long-term partnerships, for example between TNT and the World Food Program, but it has to be recognised that there are fundamental differences between the sectors (Tomasini and Van Wassenhove 2009). Again, the benefit has to be assessed over the potential compromise of principles.

The role of the **media** in humanitarian missions is becoming more and more important, making it another important stakeholder (Van Wassenhove 2006). Media can play a very critical role in informing the population and supporting organizations in their information needs, but can also be dangerous (Lettieri et al. 2009, Tomasini and Van Wassenhove 2009). The media mainly cater to their audiences that are often affected by crisis fatigue; furthermore there is often a scarcity of resources and appropriately trained journalists to cover disasters and the urgency of covering disasters particularly if they are far from their audiences interests might not be appreciated (Tomasini and Van Wassenhove 2009). Nevertheless, media reports are major generators of private and corporate donations that are essential for the financial success of any humanitarian mission.

This multitude of stakeholders leads to a complex network of interactions in HL. Each stakeholder group has widely differing attributes, such as power, legitimacy, and urgency (Mitchell et al. 1997). Interaction with the various groups will differ based on the attributes they possess, further complicating stakeholder relations, contributing to the messiness (Calton and Payne 2003, Ackermann 2012).

2.4.5 Sociopolitical Impact

The second half of the behavioural complexity part of the proposed conceptual framework consists of the *Sociopolitical Impact* upon HL, as well as the impact HL has onto its sociopolitical context. The impact of HL is not limited to humanitarian responses. Efforts in this area are also relevant to society at large. As almost every government is involved in humanitarian operations as a donor and/or a recipient (Long and Wood 1995), the public has an interest in their efficiency and effectiveness (Özpolat et al. 2015, Apte et al. 2016).

There are various levels of government involved, ranging from the supranational, to regional structures, such as tribes or groups of belligerents (Hilhorst 2002). On the demand side, governments are involved by requesting aid, allowing access or curtailing it. Thus, NGOs risk being politicised. On the supply side, governments are also the biggest donors. This is not necessarily a merely humanitarian quest and can compromise the neutrality and impartiality that define the humanitarian space. Governments may for example attempt to dispose of surplus production that is often the result of subsidies or to support diplomatic goals (Long and Wood 1995).

Sociopolitical factors add to the messiness of HL in other areas as well. One of them is planning. Both the identity of the donors and the amount of goods or finances they supply is uncertain (Van Wassenhove 2006, Charles et al. 2010). Humanitarian organisations usually receive most of their donations once a disaster has occurred and is reported in the media, which makes advance planning and continuous investment difficult (Day et al. 2012). The extreme fluctuations in the levels of funding are difficult to handle for HL. This is particularly true for preparedness, which is not something donors like to fund, but is essential for a more effective and efficient HL (Jahre and Heigh 2008, Kumar and Havey 2013, Kunz et al. 2014). Therefore, even when planning is possible, it is often not within the scope of activities an organisation can secure funding for.

Even though humanitarian organisations are not ordinarily part of the commercial sector, they still operate in a competitive market. Even non-profit organisations respond to market forces (Hannagan 1992, Thornton 2006). Non-profit organisations are not just passively at the mercy of their donors, but actively manage the relationship with them (Drucker 1990, Hannagan 1992, Stauch 2011). For any non-profit organisation, attracting donors is of vital importance. However, money spent on recruiting donors, is effectively money that cannot be spent on actual aid to the beneficiaries. While active fundraising increases donations, donors are less likely to contribute to an organisation that spends a large percentage of its income on fundraising rather than charitable work, as this is seen to be ineffective (Thornton 2006). There are many ways in which NGOs are trying to reach potential donors, including direct mail, internet pages, and televised fundraising events (Thornton 2006, Stauch 2011). These techniques have been an established part of non-profit management for a long time (Drucker 1990, Hannagan 1992). However, potential donors, both private and governmental ones, are targeted by many campaigns at once, which can lead to a donation fatigue (Moszynski 2010). Too many fundraising activities actually decrease the overall amount of donations (Thornton

2006). Therefore, humanitarian organisations are facing a situation where increased marketing could actually work to their disadvantage, not just individually, but across all non-profits asking for donations from the same target groups, creating a significant sociopolitical issue.

Sociopolitical factors also influence the demand side, which is particularly evident in man-made disasters. As previously mentioned, demand for humanitarian assistance is on the increase, but the supply of donations is not unlimited. There is highly politicised competition among NGOs for scarce donor funding (Bilodeau and Slivinski 1997, Van Wassenhove 2006, Beamon and Balcik 2008). While government donations have decreased in times of economic turmoil, private donations have remained stable, amounting to US$ 18 billion in the period from 2006 to 2010 (Stoianova 2012). Nevertheless, even the increase in donations that was seen before the economic crisis could not keep up with the increase in the number of non-profit organisations competing for those donations (Thornton 2006, Herzer and Nunnenkamp 2013). While private donors are becoming more active while governmental donations decrease, they tend to focus their efforts on different areas. Palestine is the second largest recipient of governmental donations, but receives hardly any money from private donations; countries such as Niger and the Central African Republic receive a significantly higher share of private donations (Stoianova 2012, Herzer and Nunnenkamp 2013). This suggests that not every organisation that serves a particular market can secure donations from all potential donor groups.

Recently, private donors are gaining importance. In 2010, private donations accounted for 32% of the money given to humanitarian responses, up from just 17% in 2006 (Stoianova 2012). Nevertheless, governments remain major donors, in particular to the UN agencies and the IFRC organisations. Among the different types of organisations, NGOs receive the most private funding. In 2010 US$ 4.9 billion of private donations made up 57% of NGOs' income (Stoianova 2012). This can partially be explained by donor preferences. For many private donors, it is more attractive to fund specialised organisations that only provide a limited range of services, and diversification can actually decrease the amount of donations they receive (Bilodeau and Slivinski 1997, Herzer and Nunnenkamp 2013). On the other hand, for governments a broad range of activities that large organisations can offer is often more attractive politically. Political preferences, as well as social change, contribute to the messiness of HL by creating much of the demand and supply uncertainty.

2.4.6 Complexity and Interdependency

The central tenant of the proposed conceptual framework, the element of Complexity and Interdependency combines aspects of both behavioural complexity and dynamic complexity, thus sitting at the centre of the framework. This section outlines how this element could manifest itself in HL based upon a review of extant literature.

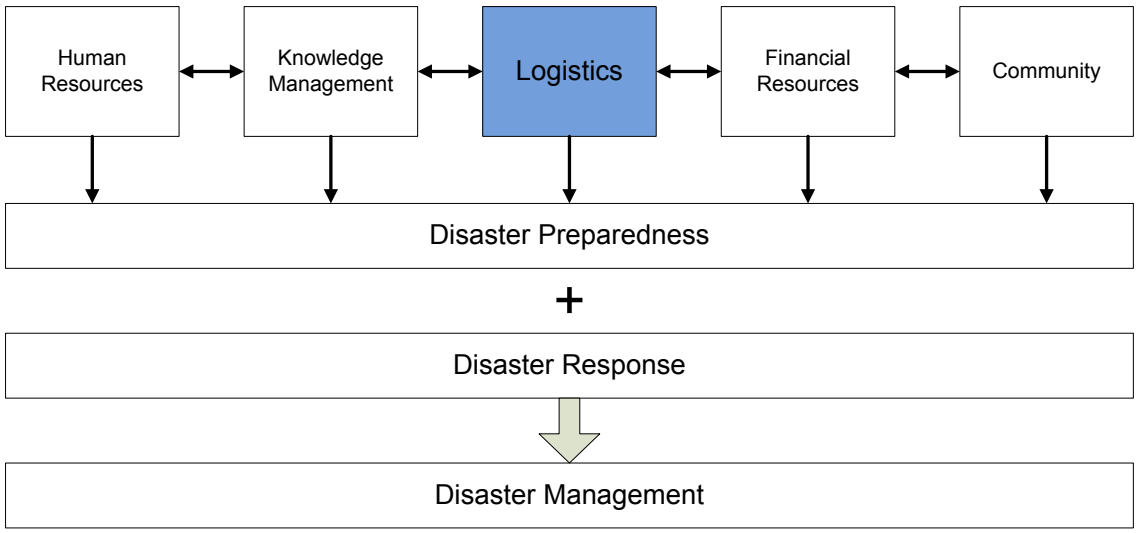


Figure 16: The building blocks of disaster management (Tomasini and Van Wassenhove 2009).

Logistics is part of a wider system, interconnected with various other parts of a company, as well as beyond the boundaries of one operation (Holmberg 2000, Stock and Lambert 2001). In Porter's value chain analysis inbound and outbound logistics are two of the primary value-creating activities (Porter 2004). Similar to its commercial counterpart, HL is also part of a wider system. HL is a part of the global humanitarian sector with an annual expenditure of more than US$25 billion (Tatham and Pettit 2010). HL is invariably linked with other functions within, as well as outwith a humanitarian organization. Figure 16 illustrates the role of logistics as one of the five building blocks of preparedness, which together with disaster response forms successful disaster management (Tomasini and Van Wassenhove 2009). This figure depicts logistics as a key function interacting with streams of information and goods from a variety of other functions. Referring back to the different phases of HL, it is obvious that HL is part of the disaster response as well. This leads to a complex sequence of temporally, geographically, and functionally interlinked activities that are all part of HL. Placing HL within the wider context and highlighting its interactions with other parts of both disaster preparedness and disaster response shows the interdependency that contributes to the messiness of HL.

A particular source of complexity is the interplay of strategic and operational phases of the disaster management cycle in HL. Strategic approaches to preparedness are easier to realise in slow-onset disasters. Stressing the role of planning and preparedness also for sudden onset disasters is relatively new to HL (Jahre and Heigh 2008, Richey 2009, Tomasini and Van Wassenhove 2009, Rawls and Turnquist 2011). Setting up the temporary SC to deal with these can be very challenging, resource intensive and time consuming (Day et al. 2012). Prepositioning, that is storing essential supplies directly in disaster-prone regions, is gaining importance and organisations are trying to strike the difficult balance between supplies being close enough to be delivered to potential disaster areas quickly, and far enough away to not be destroyed in a potential disaster (Beamon and Balcik 2008, Ghanmi and Shaw 2008, Rawls and Turnquist 2011, Bozkurt and Duran 2012, Kunz et al. 2014). This is one example of a successful interplay of the different stages of a humanitarian operation, as a focus on preparedness enables a quicker response. This stresses the importance of HL because of its ability to link the different stages.

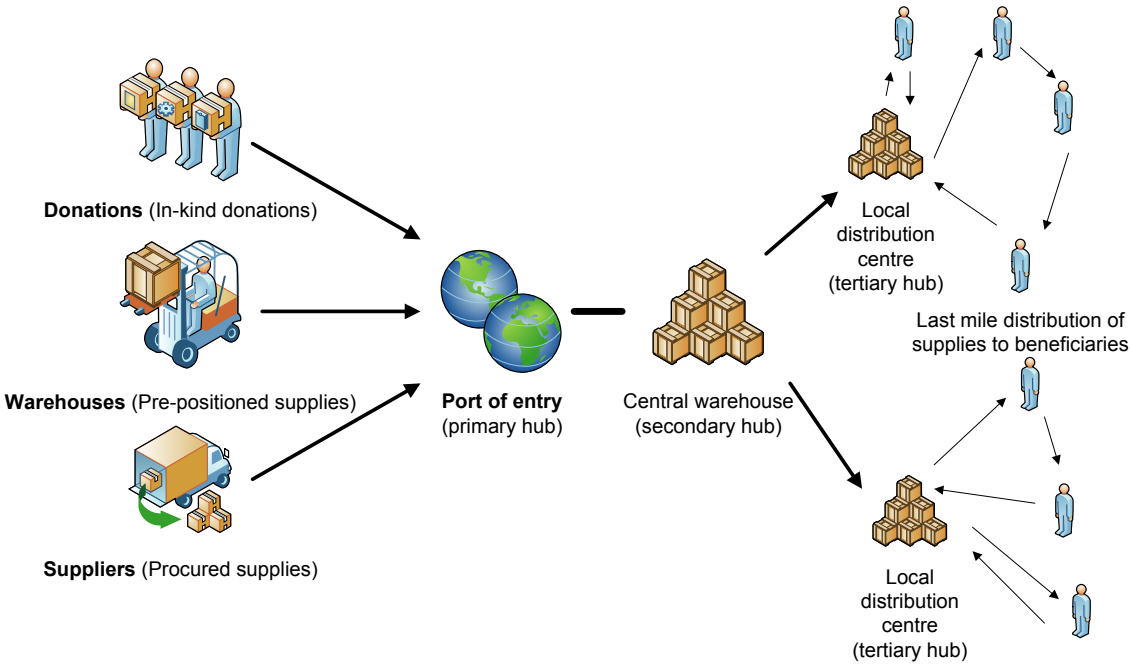


Figure 17: Structure of a humanitarian supply chain (Beamon and Balcik 2008, p. 9)

Particularly the last mile delivery can be a significant challenge in this environment (Hellingrath and Widera 2011). As demand patterns change, last mile distribution in particular has to adapt very quickly (Apte 2009). Figure 17 shows a simple humanitarian SC, but already depicts some of the complexities faced by HL (Beamon and Balcik 2008). There are several types of input that are then consolidated

in a primary hub, which is ideally located close to a port of entry into the disaster area. Due to space constraints, as well as infrastructural issues, or just the geographical spread, a network of secondary and tertiary warehouses take care of most of the storage, sorting and transfer to the beneficiaries. A survey of 62 humanitarian organisations found that 70% store goods locally, but 60% also have a central warehouse, mostly deciding between local and international sourcing based on the type of goods required (Blecken 2010). This interplay of local and global structures can create tensions. As with many international SCs, cultural differences play a major role (Long and Wood 1995, Kovács and Spens 2007, Day et al. 2012). These are particularly significant in the case of countries or populations that are usually quite isolated and little known to outsiders.

SC establishment takes place in high-stress situations and under great time pressure, often in environments that have neither a functioning logistics system nor adequate administrative or governmental structures (Pettit and Beresford 2009, Day et al. 2012). Managers should think systematically and strategically about the dynamic complexities of their situation in order to avoid a disaster turning into an even more complex, lasting crisis (Gonçalves 2008). As previously mentioned, the various stages of a humanitarian response are often treated as distinct activities, rather than part of a singular mission. This hinders the development of continuous SCs and as such leads to a large proportion of waste (Beresford and Rugamba 1996, Pettit and Beresford 2009, Taylor and Pettit 2009). With all the challenges HL faces, it can be regarded as highly dynamic, complex system (Gonçalves 2008).

2.4.7 Non-Routine Operations

Within the half of the proposed conceptual framework that focuses on dynamic complexity, *Non-Routine Operations* form one of the two aspects. The occurrence of disasters may seem singular, thus making each humanitarian mission unique and difficult to compare to another, ultimately inhibiting the development of routines in HL operations. However, Kovács (2011) argues that demand for HL is quite stable on a global scale.

To some degree, therefore, HL is a routine occurrence. For organisations and individuals involved in humanitarian operations, routine is very different from the routine SC management in commercial organisations, which would conceivably be easily overwhelmed by the disasters humanitarian organisations tend to operate in. Routines are inherent to particular organisations and not universally applicable. In their

discussion of messy problems, Mintzberg et al. (1976) highlight their distinct lack of structure. In HL this can be evidenced by the dynamic change in SCs that are by their very nature transient, quickly formed and quickly disbanded in response to a particular disaster (Day et al. 2012). In messy problems, uniqueness and non-routine nature are furthermore characterised by limited applicability of standardised solutions or approaches (Wagner 1995). While there have been some efforts towards standardisation in HL, each response retains unique elements and depends on local needs assessment and significant adaptations beyond the initial emergency response phase (Kovács and Spens 2009, Richey 2009, Tomasini and Van Wassenhove 2009, Rawls and Turnquist 2011, Kunz et al. 2014). Furthermore, disaster response and therefore HL remain non-routine operations due to the very limited organisational learning that takes place owing to a prominent lack of performance measurement and continuity in HL (Thomas and Kopczak 2005, Davidson 2007, Maon et al. 2009).

Adding to the non-routine nature of HL is the environment humanitarian responses operate it. The operating environment is marked by extreme uncertainty and often does not provide necessary infrastructure, the financing depends on donations, there are many diverse stakeholder groups, and not a loss of profits, but a loss of lives is at stake (Thomas 2004, Tatham et al. 2009, Day et al. 2012). Compared to commercial logistics, HL operates in an exceedingly uncertain and dynamic environment that is far beyond the control of any manager or organisation (Van Wassenhove 2006, Day et al. 2012). However, due to their humanitarian mandate, the humanitarian organisations will not withdraw from such an environment, even though it makes operations arduous and often costly, as well as dangerous. On the contrary, new participants will usually join in as disasters are happening, despite the inherent challenges and dangers. Logistics is one of the most testing aspects for new organisations or individuals that want to contribute to a humanitarian response, with aid often lost or obscured due to the logistical challenges new entrants encounter (Day et al. 2012).

HL spans all the stages of the SC life cycle (Apte 2009, Day et al. 2012). Throughout the life cycle the priorities of HL change a lot more quickly than in commercial situations; in the initial emergency response, speed is most critical as it reduces suffering and death, but in longer-term efforts security and efficiency become more important (Day et al. 2012). SCs follow the demand of a product during its life cycle, with phases of introduction, growth, maturity and decline and the SC has to be planned accordingly (Higuchi and Troutt 2008, Harrison and Van Hoek 2011). Different strategies might be appropriate during different stages of the cycle and for different

products (Aiken et al. 2003, Higuchi and Troutt 2008). In terms of commercial SC theories, supplies are usually "pushed" to the disaster area, whereas a "pull" system is only applied in the longer-term reconstruction (Kovács and Spens 2007). With short lead times, a short life-cycle, highly unpredictable demand, and high product variety, humanitarian goods could be described as innovative goods requiring a responsive SC (Fisher 1997). Order winners and market qualifiers are the basis for selecting appropriate SC techniques in commercial environments (Fisher 1997, Aiken et al. 2003). In the humanitarian context, the mandate to alleviate suffering sets the targets, further complicating the development of routines.

Flexibility is necessarily an important feature in HL. This includes volume flexibility to respond to disasters of different magnitude and size, delivery flexibility regarding the time it takes for supplies to reach the beneficiary, as well as mix flexibility concerning the types of good that are being delivered (Beamon and Balcik 2008). HL is known to be particularly agile (Oloruntoba and Gray 2006, Charles et al. 2010, Bozkurt and Duran 2012, Oloruntoba and Kovács 2015). HL as a system has to be able to react instantly to unforeseeable disasters, as its raison d'être. Furthermore, the lives of beneficiaries depend on HL's ability to deliver the correct items to the correct location as quickly as possible in the immediate aftermath of a disaster.

The SC structure is therefore somewhat different from a commercial context. As previously mentioned, the customers are not simply the people who pay for goods or services, and the suppliers are not necessarily being paid for the supplies (Charles et al. 2010). The flows that make up a SC are also different. Information flows are usually scarce and hard to control, as they often depend on the media, whereas the financial and material flows are strictly unidirectional from the donor to the beneficiary (Long and Wood 1995, Charles et al. 2010). Instead of connecting suppliers with customers in the way of ordinary SCs, HL links one customer group with another. The manifold disparities to ordinary commercial SCs demonstrate that HL is indeed a non-routine operation.

2.4.8 No Clear and Quantifiable Specifications

The last element of the proposed conceptual framework, part of the dynamic complexity realm, is *No Clear and Quantifiable Specifications,* which is an area common to messy problems as they are difficult to quantify and capture with standard management techniques (Wagner 1995, Lyles 2014). Clear and accurate information on the nature of the problem at hand is difficult to obtain. In HL, information management

issues such as the collection and analysis of data, as well as suitable information systems are key concerns (Blecken 2010). Over all, logistical success in a humanitarian mission depends mainly on information management (Long and Wood 1995, Day et al. 2009). Information forms the basis for many areas of HL. For example, accurate information is essential for activities such as fleet management, inventory planning and sourcing (Blecken 2010). Information management is also the foundation for successful organisational learning, the building of a knowledge base and performance measurement (Thomas and Kopczak 2005). This aids an organisation become more efficient and effective over time.

The barriers to information management start with the setting in which humanitarian missions take place. Problems with information availability, as well as the distribution of available information hinder the effective development of HL procedures (Day et al. 2009, Bharosa et al. 2010, Tatham and Spens 2011). These are particularly pertinent where clear information is required to be passed on to external stakeholders, such as donors or suppliers in order to ensure the SC can operate according to demand (Long and Wood 1995, Blecken 2010, Hellingrath and Widera 2011). While parts of these issues are tied to organisational issues, the destruction of necessary infrastructure does not merely hinder goods transport, but also extends to ways of transmitting and recording information (Thomas and Kopczak 2005). The resultant lack of accurate information leads to high levels of uncertainty experienced due to a lack of understanding of the problem situation (Tomasini and Van Wassenhove 2009, Day et al. 2012).

As previously discussed, demand usually has to be estimated at first. In HL, it is very difficult to design a SC solely based forecasts, as there is a very limited time frame available to collect information (Pettit and Beresford 2005, Tatham and Kovács 2007, Kovács and Spens 2009). Therefore, needs assessment is an on-going requirement in any humanitarian response, but can be very challenging, especially in the immediate aftermath of a disaster (Thomas and Kopczak 2005, Blecken 2010). This has direct implications for HL, as the SC structure may only change to a ‘pull’ system once demand data has been established (Long and Wood 1995, Whybark 2007, Day et al. 2012). This lack of information in the initial response leads to inefficiencies and often even a lack of effectiveness. As accurate demand data is often not accessible, organisations need to have the ability to estimate the demand based on any data that is available. For the initial disaster response, the SC needs to quickly have the best data available on the disaster are, affected population and prospective needs (Thomas and

Kopczak 2005, Blecken 2010). On this basis, it will be decided whether a response can be initiated, and what is required if the organisation decides to respond. Information forms the basis of the entire operation.

The need for information management does not stop after the initial response phase of the cycle. Assessment is conducted throughout a crisis, both to adapt internal processes, as well as to pass on information to external stakeholders, for example governments, the media or donors (Blecken 2010). A lack of information is particularly difficult in the relationships with governments, as organisations are often depended on information on regulations, requirements and appropriate contacts (Hellingrath and Widera 2011). Information might be required by authorities both in the home country of an organisation and in the disaster area, for reasons of accountability (Long and Wood 1995). The messiness of HL is difficult to communicate because of the lack of clear and quantifiable data.

These issues compound to making HL as a whole difficult to capture and understand. If it is impossible to quantify performance within a humanitarian response, performance measurement and subsequent improvement suffer (Beamon and Balcik 2008, Tatham and Pettit 2010, Schiffling and Piecyk 2014, D'Haene et al. 2015). Furthermore, organisational learning, which is essential to further develop and advance HL, is inhibited by a lack of information (Anttila 2014, L'Hermitte et al. 2016). Various mechanisms of both individual and organisational learning are required to take place to facilitate actual improvements both within individual organisations, as well as across the sector (Lu et al. 2013, Anttila 2014). Henceforth, the lack of clear and quantifiable specifications also has wide-ranging consequences for the development of HL.

2.4.9 Humanitarian Logistics as a Messy Supply Chain Context

In the preceding five sections, each of the characteristics of a MSC according to the previously developed proposed conceptual framework has been explored within the extant literature in HL. This review has brought fourth evidence of each of the five characteristics in the context of HL, thus indicating that this might be a suitable context for further research, as it seems to be exhibiting all the characteristics of MSCs to varying degrees. HL, as described in literature, has been shown to contain both dynamic and behavioural complexity, matching all five of the previously proposed characteristics. Therefore, the first two research objectives as identified in Chapter 1 have been addressed. A conceptual framework for the management of non-standard SCs has been developed and the resultant characteristics have been investigated with a

particular focus on HL, establishing that HL is a suitable context for MSCs. In the following, key themes from the preceding literature review will be summarised according to the five characteristics of the proposed conceptual framework.

Multitude of Diverse Stakeholder Views: There is a wide range of stakeholders in HL, with many exhibiting their own motivations and agendas that are not necessarily conform to a humanitarian agenda, thus leading to divisions in what should be aligned SCs. Despite the non-profit environment, there is fierce competition for limited amounts of funding among humanitarian organisations. Particularly striking from a SC perspective is the duality of both customers and suppliers. Customers of HL are both donors and beneficiaries, whereas the suppliers are both donors and regular paid suppliers. Views among these groups are bound to differ widely, as well as their involvement with the SC. The donors' role is critical as they provide the necessary resources and thus hold influence over the aim and the execution of HL. The beneficiaries are often regarded as passive stakeholders, but should actually be essential in assessing HL performance.

Sociopolitical Impact: Sociopolitical factors can trigger humanitarian missions, for example in the case of man-made disasters. Demand is furthermore regulated by the governments of affected areas, as they can request aid and grant or withdraw access for humanitarian organisations, all factors that shape HL. On the supply side, governments are generally the biggest donors, providing humanitarian organisations with essential funds for their activities. However, this creates political tensions, as funding is invariably tied to political agendas. Such agendas do not necessarily conform to humanitarian principles. Nevertheless, funding—and by extension the associated political priorities—shape the SC from planning to execution as funds are granted or withdrawn for certain activities. The strong sociopolitical impact thus introduces further uncertainty into HL.

Complexity and Interdependency: HL forms part of a wider system that sits within the global humanitarian sector. Links are evident both internal to a humanitarian organisations as HL interacts with different departments and levels within the organisation, and externally as the SC depends on a complex network of suppliers and customers. Further increasing complexity is the interplay of strategic and operational phases of a humanitarian response, which necessitates planning that in turn is dependent on information that is difficult or impossible to obtain. The operational environment of HL is extremely dynamic, as it is complex and parts of it change frequently, particularly

as a humanitarian response goes through its lifecycle. Generally, HL SCs are transient and their establishment, as well as disbanding, relies on a range of external factors.

Non-Routine Operations: The extreme uncertainty of the operational environment plays a major role in making HL non-routine operations. The very reason for their existence is the occurrence of disasters, which is in most cases difficult to accurately predict. Furthermore, the operational environment is characterised by a lack of infrastructure, as well as in many cases social structures, resulting in a need for highly flexible SCs that are able to respond to this lack of routine. In addition, within a non-profit environment, the funding for HL is uncertain and highly changeable, which complicates planning and longer-term investments. Priorities change frequently and often rapidly over the lifecycle of a humanitarian mission, further adding to the non-routine nature of HL and putting the system under pressure to react quickly. To exacerbate the situation, there is often very scarce information on the situation.

No Clear and Quantifiable Specifications: The lack of clear and accurate information on both the operational environment, as well as the performance of the SC itself, renders an assessment of HL impossible in many cases. Organisational learning, and therefore the further development of HL and humanitarian responses as a whole is inhibited. While part of the unavailability of information is rooted in the high uncertainty, the lack of adequate infrastructure also contributes to it. Crucially for the SC, there is often no accurate demand data. However, an understanding of demand is important for the SC structure, particularly in a quickly assembled transient SC. Furthermore, with a lack of information on the actual performance of the SC, questions of accountability arise. Much of the information that is collected is necessary for purposes of accountability to large donors who wish to assess the effectiveness of their contributions.

Not just the five characteristics of MSCs are evident in HL, but also the links between them, as depicted in Figure 18. *Complexity and Interdependency* rightly forms the centre of the proposed framework, as all of the issues discussed link back to this underlying cause. There are links apparent between the two characteristics in the dynamic complexity half, mainly the lack of adequate information inhibiting the development of routine operations. The two characteristics in the behavioural complexity half are also linked, as stakeholders cause and shape the sociopolitical impact of HL.

As it has now been established that there is evidence of all five characteristics of MSC in the HL literature. Therefore, the next research objective to be addressed in the

subsequent chapter is to design and carry out empirical research to explore the proposed conceptual framework in the context of HL. Based upon the primary data collected, the framework will then be refined.

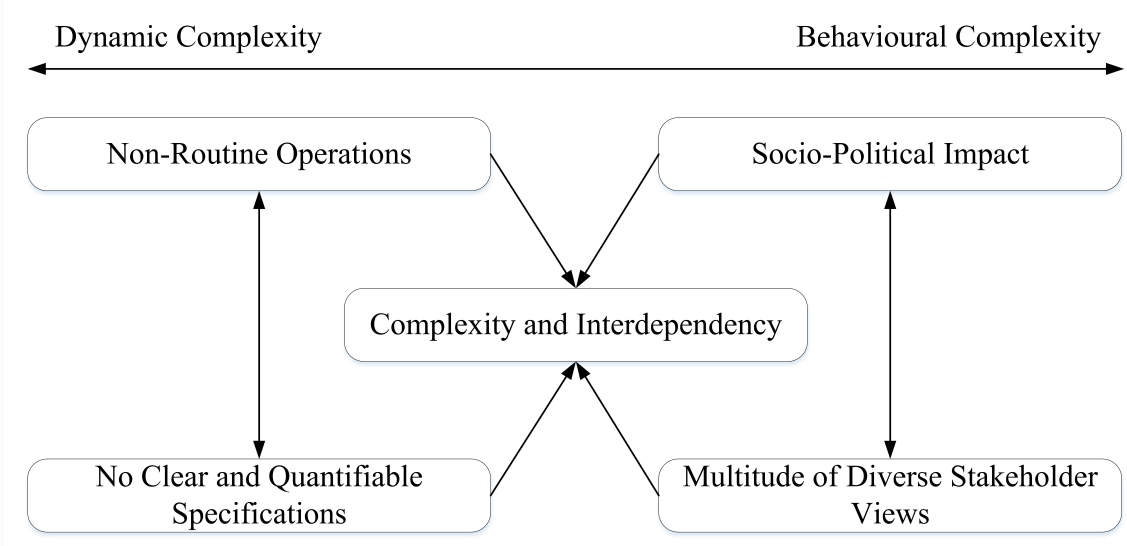


Figure 18: A conceptual framework for messy supply chains (author's own figure)

2.5 Summary

This chapter has provided an in-depth discussion of the various streams of literature that constitute the background of this thesis. By developing a conceptual framework for the study of non-standard SCs and viewing the context of HL through the lens of the proposed conceptual framework, two of the research objectives were addressed in Chapter 2.

First, key concepts were discussed, establishing logistics, SC management, as well as Hl, as these terms will be utilised throughout this thesis. An overview has been given of the debate surrounding the differentiation between SC management and logistics in the commercial realm. It was then established that the difference is less pronounced in the humanitarian context, as HL tends to straddle both concepts in its usage among both practitioners and academics.

Then, non-standard SCs were explored. To start with, there was an overview of various ways of classifying types of SCs, followed by a discussion of SC types that are not adequately captured by existing models. CAS and the study of wicked and messy problems were introduced as ways to address such non-standard SCs. Based upon these approaches, the proposed conceptual framework for non-standard SCs was developed, introducing the concept of MSCs.

The third section of Chapter 2 provided a discussion of the context of this research, introducing the operational environment of HL. This is one potential context within which non-standard SCs could occur. Different types of disasters and their respective impact on HL were covered. Furthermore, operations within humanitarian operations and key actors involved in them were reviewed. A specific was placed upon their specific roles and motivations, which is of particular importance given the critical realist approach taken in this thesis and the importance of individual worldviews within that school of thought.

Finally, theory development in HL was discussed and the proposed conceptual framework for MSCs was reviewed in the context of HL—*Multitude of Diverse Stakeholder Views, Sociopolitical Impact, Complexity and Interdependency, Non-Routine Operations,* and *No Clear and Quantifiable Specifications*. Evidence for each of the five elements of an MSC was discovered in the extant literature, providing evidence that this could be a context in which to empirically validate the proposed conceptual framework.

3 Research Methodology

Previous chapters have established the theoretical context for this research, culminating in the conceptual framework to be explored through primary research. This chapter presents the philosophical underpinning, as well as the research methodology applied in both the primary data collection and the data analysis. After a brief discussion of epistemology and ontology, three different research paradigms are presented with a particular focus on those employed in logistics and SC management research, before the paradigm applied in this thesis is analysed in detail. The choice of a research paradigm will inform the selection of appropriate research methods for the study to be conducted, as the paradigm sets out the underlying world view (Guba and Lincoln 1994, Lincoln et al. 2013). Furthermore, it is essential to map the conceptual framework onto the methods to demonstrate the links between them. This will be done through a discussion of the research framework presented in Figure 20. Furthermore, a detailed account of the research methodology and methods is provided. Finally, a section on research quality is presented.

3.1 Ontology and Epistemology

The approach to questions in logistics and SC research depends mainly on the attitudes, philosophies and worldviews of researchers. Although there has traditionally been little debate of philosophical issues in this particular area of research, the recent development of more fundamental philosophical reflections can be seen as a sign of maturation in the discipline (Solem 2003). It is essential to investigate the ontology and the epistemology that underlie a particular piece of research. To ignore them would risk compromising the quality of the research (Easterby-Smith et al. 2012, Creswell 2014). Epistemology and ontology are closely linked concepts within the 'Philosophy of Science' describing the process of learning about reality and the nature of reality respectively (Solem 2003). Implicitly or explicitly, any research takes a stance on these issues. The epistemology and ontology of a study also inform the choice of methodology (Lincoln et al. 2013).

Ontology is, at its most fundamental level, the philosophical study of being and existence (Remenyi et al. 1998). It examines the nature of reality and the researcher's understanding of it, focussing mainly on the possibility of the existence of an objective reality (Guba 1990, Crotty 1998, Lincoln et al. 2013). Two opposing views of ontology exist:

- The *objectivist* view ascertains that social entities exist independently of and externally to social actors (Jonassen 1991, Creswell 2014). Solem (2003) refers to this as a realist stance which states that there is an objective reality that exists independent of the observer.
- The *subjectivist* view establishes that social actors create constantly changing social phenomena through their perceptions and the actions they perform based on these perceptions (Burrell and Morgan 1979, Brannick and Coghlan 2007). Therefore, an in-depth examination of a particular situation is necessary to comprehend not merely the actual events, but also their underlying reality (Crotty 1998, Creswell 2014). This view of reality as a product of individual consciousness can also be referred to as nominalism (Solem 2003).

The nature of acceptable knowledge depends on the epistemology employed in a research study (Shukla 1995, Gumanski 1999, Solem 2003, Bryman 2012). Epistemology establishes the nature of knowledge and the ways of observing the world around us that lead to the obtainment and distribution of knowledge (Burrell and Morgan 1979, Crotty 1998). There are two opposing views of epistemology:

- *Positivism* maintains that knowledge in the social sciences can be just as real and suitable for law-like generalisations as it is in the natural sciences (Remenyi et al. 1998).
- *Constructivism or Interpretivism* views knowledge as subjective and maintains the need for a researcher to differentiate between the ways in which social actors interpret reality, leading to a need for a more empathetic approach to research (Bryman 2012).

In the following section, the influence of different ontological and epistemological positions on the development of the main research paradigms of positivism and interpretivism, as well as the more recently developed paradigm of critical realism, is discussed. The selection of a research paradigm for this thesis is then justified and the rest of this chapter proceeds to outline the primary research undertaken in the tradition of the chosen research paradigm.

3.2 Research Paradigms

Thomas Kuhn (1962) developed the construct of paradigms in his book *'The Structure of Scientific Revolutions'*, which has been widely debated across both natural and social sciences, despite criticism for a lack of conceptual clarity (Masterman 1970).

A paradigm determines the particular way in which a certain community of researchers approaches the study of phenomena, as well as influencing the research methods employed to do so (Collis and Hussey 2003, Blaikie 2004, Donmoyer 2008, Kelemen and Rumens 2008). A shared worldview forms the basis of a paradigm, resulting in certain commitments, beliefs, values, methods and outlooks (Burrell and Morgan 1979, Schwandt 2007). Intense debate of Kuhn's monograph and its implications lead to the so-called *'paradigm wars'* (Gage 1989, Oakley 1999, Klaes 2012, Shepherd and Challenger 2013), which resulted in a heightened need among social scientists to distinguish themselves according to the research paradigm they adhere to (Bryman 2012). Each paradigm is associated with a particular ontological and epistemological stance, as well as certain methodological considerations (Lincoln et al. 2013). The following sections consider the underlying theoretical perspectives and associated research methods of three paradigms.

3.2.1 Positivism

The positivist paradigm is most closely related to a view of the world that reflects the principles of the natural sciences. It relies on researching observable phenomena that can be analysed through the gathering of verifiable facts and the testing of theories, leading to the development of law-like generalisations in an objective and value-free way (Mentzer and Kahn 1995, Remenyi et al. 1998, Gammelgaard 2004, Bryman 2012, Saunders et al. 2012). As positivism emerges from the research of the physical world around us, it has historically been the dominant paradigm, only relatively recently being challenged by the emergence of alternative paradigms as human activity and interaction have attracted more attention in academic research (Collis and Hussey 2003).

Researchers adhering to the positivist research paradigm adopt an objectivist ontological stance and a positivist epistemology. Reality is seen to be singular and to exist independently of the researcher, governed by all-encompassing natural laws (Guba 1990, Lincoln et al. 2013). Knowledge about reality is absolute and encompasses phenomena that are both observable and measurable, independent of any interpretation by the researcher (Collis and Hussey 2003, Creswell 2014). This strong focus on subjectivity leads to a methodological reliance on quantitative methods that yield objective results uninhibited by the personal biases, values or beliefs of the researcher (Naslund 2002, Frankel et al. 2005, Easterby-Smith et al. 2012).

SC research and the wider field of operations research are focused on understanding phenomena of interest, thus requiring theory to explain conceptual

relationships experienced in the empirical work (Boyer and Swink 2008, Wacker 2008). The epistemology and ontology in SC management and logistics has sparked much debate. Positivism has been shown to be the dominant research approach (Mentzer and Kahn 1995, Naslund 2002, Spens and Kovács 2006). Research in logistics and SC management is traditionally positivistic with a strong focus on quantitative methods (Meredith et al. 1989, Gammelgaard 2004, Frankel et al. 2005, Pilkington and Meredith 2009). This has been shown in several literature reviews that analysed the methods usage of research papers (Gammelgaard 2004, Burgess et al. 2006). This reliance on positivism and quantitative methods might stem from the origin of logistics in engineering and manufacturing disciplines, which often employ the scientific world view of positivism (Bryman 2012). However, there is a lack of theoretical underpinning in many studies in what is still seen as an emerging area of science (Chicksand et al. 2012).

Over time, the circumstances of the field have changed significantly, rendering the traditional positivist paradigm cumbersome (Golicic et al. 2005): As the complexity of SCs increases, as previously discussed, the traditional quantitative methods, grounded in a positivist paradigm become increasingly insufficient to capture the full depth and variety of the issues they are supposed to solve. A review of 108 articles published in the *Journal of Business Logistics* between 1999 and 2004 revealed that more than half of them utilised methods within a detached, objective, external perspective such as experiments or surveys, but only seven used the involved, subjective, cognitive methods of case studies and observations (Frankel et al. 2005). Some authors claim that the development of the field has been impaired by its strong reliance on the positivist paradigm, and the resulting limited range of research methodologies and theories employed (Gammelgaard 2004, Burgess et al. 2006). The ensuing lack of practical relevance is particularly significant in a field that is grounded in interactions with industry.

3.2.2 Interpretivism

In contrast to positivism, interpretivism views the subject matter of the social sciences, which comprises people and their institutions, as *"fundamentally different from that of the natural sciences"* requiring research that honours these differences by reflecting the distinctiveness of human beings and their experiences (Bryman 2012, p. 15). There is no single reality or absolute truth (Carson et al. 2001). Reality is not seen to be objective, but dependent on the individual, as it is socially constructed and only

assigned meaning by social actors who then communicate their experience of reality through language and social interactions (Bryman 2012, Easterby-Smith et al. 2012).

Interpretivism aims to understand social actions in terms of their meaning to the actors (Ransome 2010). Ontologically, the concept of reality is dependant on the individual actor, a subjectivist ontological stance (Burrell and Morgan 1979). Epistemologically, the aim of an interpretivist study is to understand a phenomenon in a specific context. The focus of interpretivist research is on understanding and interpretation rather than description and explanation (Carson et al. 2001). The researcher is not detached from the study, as it is seen to be impossible to completely eliminate the influence of the researcher's worldview and experience (Bryman 2012). The adoption of an interpretivist approach also influences the choice of methods, as qualitative methods dominate interpretivist research.

Table 2 (Carson et al. 2001) summarises the differences in ontology, epistemology, and methodology between positivism, which dominates much of logistics and SC research, and Interpretivism.

As problems in logistics and SC management are often ill-structured and reflect real-life problems, holistic and systemic thinking is essential, and so are multiple approaches and paradigms (Naslund 2002). As Rotaru et al. (2014) postulate, mere accumulation of extensive empirical data does not enhance understanding of the field unless a philosophical stance is taken that enables the understanding of the underlying mechanisms that shape the phenomena experienced in SC management. A departure from the positivist paradigm in logistics and SC research, potentially in favour of an interpretivist one, is therefore seen as desirable for the further development of the discipline (Naslund 2002, Gammelgaard 2004, Frankel et al. 2005, Golicic et al. 2005, Burgess et al. 2006).

Table 2: Positivism and Interpretivism: Ontology, Epistemology and Methodology (Carson et al. 2001)

	Positivism	Interpretivism
Ontology		
Nature of "being" nature of the world	Have direct access to the real world	No direct access to the real world
Reality	Single external reality	No single external reality
Epistemology		
"Grounds of knowledge" relationship between reality and research	Possible to obtain hard, secure objective knowledge Research focuses on generalisation and abstraction Thought governed by hypotheses and stated theories	Understood through "perceived" knowledge Research focuses on the specific and the concrete Seeking to understand specific context
Methodology		
Focus of research	Concentrates on description and explanation	Concentrates on understanding and interpretation
Role of the researcher	Detached, external observer	Researcher wants to experience what they are studying
	Clear distinction between reason and feeling	Allow feelings and reason to govern actions
	Aim to discover external reality rather than creating the object of the study	Partially created what is studied, the meaning of the phenomena
	Strive to use rational, consistent, verbal, logical approach	Use of pre-understanding is important
	Seek to maintain clear distinction between facts and value judgements	Distinction between facts and value judgements are less clear
	Distinction between science and personal experience	Accept influence from both science and personal experience
Techniques used by the researcher	Predominantly formalised statistical methods	Primarily non-quantitative

3.2.3 Critical Realism

Critical realism as a philosophical stance is mainly associated with the work of Roy Bhaskar (Bhaskar 1975, Bhaskar 1989, Bhaskar 1994, Bhaskar 1997, Bhaskar 2012). Critical realism adopts a realist ontology, maintaining that there is a reality that exists independent of the individual observer, while also acknowledging that our knowledge of reality is incomplete, as it is based on subjective observations, thus adhering to an interpretivist epistemological stance (Solem 2003, Saunders et al. 2006). It has been stated that critical realism bridges the differences between the opposing positions of positivism and interpretivism, as it postulates the existence of a reality, while at the same time maintaining the subjective nature of our knowledge about it (Frauley and Pearce 2007, Aastrup and Halldórsson 2008, Adamides et al. 2012).

Critical realism has increasingly been incorporated in social scientific enquiry since the late 1970s (Frauley and Pearce 2007). This philosophical stance has been utilized for theoretical and empirical works in numerous areas of social sciences that are related to logistics and SC (Rotaru et al. 2014). An overview of some relevant papers is provided in Table 3.

Table 3: Critical Realism in Related Research Areas (based on (Rotaru et al. 2014))

Discipline	Academic journal papers (selection)
Economics	(Lawson 1998, Fleetwood 1999, Downward and Mearman 2007)
Management Science	(Mingers 2000a, Mingers 2006a)
Organisation Management	(Tsang and Kwan 1999, Fleetwood 2005)
Information Systems	(Dobson 2001, Strong and Volkoff 2010, Wynn and Williams 2012, Mingers et al. 2013, Volkoff and Strong 2013, Zachariadis et al. 2013)

Rotaru et al. (2014) state that mere description of phenomena through empirical research is insufficient to gain full understanding of SC topics and identify the *"need for rigorous, empirically based theories that enhance understanding of the causal relationships between the structural elements and properties of the business processes"* (p. 118). A central aspect of critical realism is the focus on the underlying causes for events and behaviours that can be observed empirically (Danermark et al. 2002). However, critical realism denies the existence of an exclusive and absolute truth, and it

is recognized that several explanations for a particular event or behaviour may exist (Sayer 2000, Hodgkinson and Starkey 2012). This openness has been suggested as a potential way to overcome fixed structures of thinking (Hodgkinson and Starkey 2012) or 'theory-induced blindness' (Kahneman 2011). Critical realism's application in logistics research has been suggested as being particularly useful in relation to the use of case studies, predominantly because of its ability to capture a variety of differing viewpoints (Aastrup and Halldórsson 2008, Adamides et al. 2012).

Bhaskar (1989) introduces the stratified critical realist ontology that is based on the division of reality into three 'domains of being':

- The *Real*: Consists of mechanisms and causal structures that form *"the actual states and happenings in the world"* (Bhaskar 1975, p.34). When activated, these might trigger observable events (Aastrup and Halldórsson 2008).
- The *Actual*: Represents all possible events and behaviours that might occur based on the mechanisms and causal structures present in The Real (Bhaskar 1989).
- The *Empirical*: Comprises actual events and behaviours that human actors experience and observe (Bhaskar 1989).

The stratified critical realist ontology implies that the insights gained from empirical data collection in the first instance describe the *Empirical*. Empirical knowledge can then lead to knowledge about underlying generative mechanisms and their causal powers that lead to the observed events and behaviours, as well as others that have not been observed, but are part of the *Actual* (Bhaskar 1975, Mingers 2000a, Mingers 2006a). The aim of critical realist research is therefore to identify factors that are responsible for, or at least aid the occurrence of a particular observed phenomenon (Lawson 1998). The stratified critical realist ontology also highlights the limitations of empirical research as there are realms beyond that which is empirically observable (Hamel 2002). Some unobservable features can be known to some degree through inference if they plausibly explain the existence or transformation of observable phenomena (Frauley and Pearce 2007). Explanations for empirical events or behaviour are usually presented in the form of *"underlying mechanisms or structures that generate relationships, regularities or patterns in the real world"* (Reed 2005, p.1666), whose inherent tendencies in turn become evident in the empirical domain.

The three domains are linked through the retroductive mode of reasoning (Rotaru et al. 2014). Retroduction has been described as *"a thought operation that moves*

between knowledge of one thing to another for example, from empirical phenomena expressed as events to their causes" (Downward and Mearman 2007, p.88) or as a reasoning process that allows researchers to *"move back and forth between elements and possible causal powers, in order to justify possible explanations and eliminating alternative explanations"* (Aastrup and Halldórsson 2008, p.757). Some writers regard abduction as a potentian, but not necessary part of retroduction, a process for recontextualisation of specific phenomena as more general phenomena (Danermark et al. 2002, Downward and Mearman 2007), this work follows a different view in which retroduction and abduction are synonymous (Mingers 2000a). This is congruent with the usage of retroduction and abduction in the research approach employed within this thesis, the RRREI framework detailed below (Rotaru et al. 2014).

Based on empirical data that describes the perception of an actual event or behaviour, retroductive reasoning proposes generative mechanisms that could explain the existence of the particular empirical evidence, and tests these (Mingers 2000a, Mingers 2006a). In this process the presentation of the empirical data through the lens provided by a particular theory is separate from the postulation of potential generative mechanisms (Rotaru et al. 2014). Critical realism recognizes that multiple generative mechanisms can elicit a certain event or behaviour and aims to expand the understanding of such structures, while recognizing that there is no exclusive truth (Hodgkinson and Healey 2008, Hodgkinson and Starkey 2012).

Critical realism acknowledges the importance of both structure and agency, but balances them rather than emphasizing one over the other, as their importance is seen to be dependent on the context (Sayer 2000, Pearce 2007, Hodgkinson and Starkey 2012). While structures and cultures are regarded as change-resistant to varying degrees, critical realism states that it is possible to redesign them to be more emancipatory (Lawson 1998, Hodgkinson and Starkey 2012).

3.2.4 Research Paradigm and Approach in this Thesis

The over-reliance of logistics and SC management research on the positivist paradigm has been criticised by various authors (Naslund 2002, Solem 2003, Gammelgaard 2004, Frankel et al. 2005, Golicic et al. 2005, Aastrup and Halldórsson 2008). In particular, criticism has been aimed at the detached position of the researcher in positivist research and the notion that systems can be re-engineered by adjusting the relevant parts and expecting all actors to follow the new logic without any interference of beliefs, agendas or opinions (Aastrup and Halldórsson 2008). As human interactions

form an integral part of modern logistics and SC research, this view is seen to be overly simplistic and not conducive to creating practical impact.

Recognising this criticism, as well as the nature of the topic under investigation, which is highly dependent upon human interactions, this thesis adopts a critical realist paradigm. Critical realism is particularly suitable for research involving a wide range of stakeholders and aiming to create knowledge, as well as to elicit action (Sayer 2000, Hodgkinson and Starkey 2012). It is therefore an appropriate paradigm to be used for studying a topic that is characterised by the interactions of a wide variety of stakeholders, as is the case with the present study.

Table 4: Research Approaches according to Kovács and Spens, 2005

Deductive	Rule – Case – Result	Rules are derived from theory, empirically tested, to then present generalizable results
Inductive	Case – Result – Rule	Empirical observations lead to the development of propositions that are then put into a theoretical frame
Abductive/Retroductive	Rule – Result – Case	Rules are anticipated, the case presents a plausible conclusion if the anticipated rules are correct

Through systematic retroduction, critical realism provides a coherent framework, as well as theory, for explanation of phenomena encountered in the social sciences (Reed 2005, Pearce 2007). Abductive studies seek to distinguish between generalizable causal powers and circumstances that relate only to a particular situation in which a phenomenon occurs (Danermark et al. 2002, Bryman 2012). As such, they differ from the more traditional inductive and deductive approaches that use data from specific cases to develop general rules or test a hypothesis in particular cases respectively (Kovács and Spens 2005). An overview of the three different research approaches is provided in Table 4.

Table 5 outlines the research context in which this study is set. From the initial statement of the research problem, the scope and unit of analysis of this study are defined and a research question is developed. The research question is then addressed through a research process driven by abductive reasoning, which combines empirical research and the chosen theoretical lens, in this case that of wicked and messy problems and CAS, which has been employed in the development of the conceptual framework. The five characteristics of MSCs depicted in the proposed conceptual framework are hypothetical generative mechanisms. The critical realist notion of causality is of particular importance here, as the emergence of particular phenomena is dependent not solely on the underlying causal powers, but is also influenced by the context in which events take place (Sayer 2000). In this case, the context is provided by the environment of HL in which the applicability of standard SC management approaches and the outcomes they elicit in non-linear SCs is investigated.

Table 5: Outline of the Research Context (adapted from Rotaru et al. 2014)

Research Problem	Effect of the existence of non-linear SCs on the applicability of standard SC management approaches and the outcomes they elicit.
Scope	Analysis of HL as an example of such non-standard SCs.
Unit of Analysis	Humanitarian responses
Research Question	How do particular characteristics of non-standard SCs such as HL influence the applicability of SC management approaches and the outcomes that can be achieved?
Research Process Driven by Abductive Reasoning:	
Research Results	44 semi-structured interviews with individuals involved in humanitarian responses as part of non-profit or governmental organisations
Theoretical Lens	"Wicked" (Rittel and Webber 1973) or "messy" problems (Ackoff 1981), CAS (Choi et al. 2001)
Causes	All five postulated generative mechanisms are validated against the empirical data.

The initial conceptual framework forms the foundation of the enquiry, including hypothetical generative mechanisms, and is then modified based on insights gained from empirical data and its analysis (Dubois and Gadde 2002). This is congruent with

the case study approach of gathering data, analysing it with theory and incorporating additional theory as required (Langley 1999). Similar approaches have been used in SC research for example in a study of performance in health care SCs (Shah et al. 2008) and by Fredendall et al. (2009) in a case study of swift, even flow in internal hospital SCs.

RRREI (Resolution, Redescription, Retroduction, Elimination, Identification) is an abductive method to elicit generative mechanism based on Bhaskar (1994) and suggested for use in applied science by Mingers (2000a). An earlier version of the method was described as RRRE (Bhaskar 1975), introduced as a way to generate valid knowledge of open systems (Pearce 2007). SCs are seen as such systems (Croom et al. 2000, Maull et al. 2012). Rotaru et al. (2014) discuss the application of RRREI in SC research using the example of Fredendall et al.'s (2009) study on the internal SC of a perioperative surgical services department. RRREI is closely linked with the three previously described ontological domains of critical realism, as the research process investigates all three, while following the standard abductive reasoning process described above, going from rule to result to case. Table 6 details the steps of the RRREI process and provides an overview of the logic of research discovery adopted in this thesis. The retroductive approach is based on empirical knowledge, as well as a particular theoretical lens through which potential underlying generative mechanisms that lead to the observed behaviours are identified. These constructs are then validated against the empirical data, eliminating those that are not evident (Danermark et al. 2002, Kovács and Spens 2005). The fit of the RRREI approach within the wider context of this thesis is explored in the research framework shown below.

In the primary data collection, the critical realist ontological domain of the Real is explored by collecting data from actors within the scope of the research as identified above. In Chapter 4, the gathered data is then redescribed through the lens of wicked and messy problems, in the form of the conceptual framework, as detailed in the literature review, which covers the ontological domain of the Actual. The Real is addressed in Chapter 5, through retroduction, elimination and identification.

Table 6: Application of critical realist RRREI method of logical abduction in this thesis (adapted from Rotaru et al. 2014)

CR Ontological Domains	Steps of CR's RRREI Abductive Reasoning	Logic of Research Discovery Adopted in this Thesis
EMPIRICAL (empirical knowledge)	**Resolution** (theory-free classification of empirical data)	Empirical data on structure and challenges of humanitarian responses collected through 44 semi-structured interviews with individuals involved in humanitarian responses as part of non-profit or governmental organisations
ACTUAL (all events and behaviours)	**Redescription** (representation of the empirical data through the prism of a selected theory)	Selection of CAS (Choi et al. 2001), "wicked" (Rittel and Webber 1973) or "messy" problems (Ackoff 1981) as a theoretical lens to enhance the understanding of the factors that affect the applicability of standard management approaches and the outcomes they elicit
REAL (generative mechanisms)	**Retroduction** (postulation of underlying generative mechanism(s))	Five underlying generative mechanisms form part of the proposed conceptual framework. From the primary, evidence for their existence is gathered, adapting the framework as necessary
	Elimination (isolation of hypothetical generative mechanism(s) and elimination of alternative one(s))	The relevance of the hypothetical generative mechanism is validated against the collected empirical data and research evidence from HL literature, all are found to be valid
	Identification (identification of most relevant generative mechanisms)	Differences in the weighting of the five generative mechanisms and the identified connections and interactions between them result in a revised conceptual framework

3.3 Research Framework

In the literature review, a theoretical background to the topic was provided, which has mainly drawn upon two distinctive streams of literature, namely literature on SCs and logistics, and literature on CAS, wicked and messy problems. Combining these two streams of literature has ultimately resulted in the conceptual framework for MSCs, which states five characteristics that MSCs may exhibit based on a thorough analysis of the literature. This framework is to be explored through empirical methods in the particular context of HL.

Figure 19 presents the research framework for the exploration of the conceptual framework for MSCs. This is an extension of the generic framework for logistics research developed by Mentzer and Kahn (1995). Their framework details the main stages of a logistics research project that have been followed here as outlined below.

Idea generation and substantive justification have been detailed in the literature review. This research is founded in the observation that while SCs are conventionally portrayed as linear constructs from suppliers to customers including the flow of materials, information and money, not all SC types follow this regular pattern. Some SCs are non-linear, highly complex and have a significant impact on stakeholders and society as a whole. To wholly capture the management challenges of this type of SC, this research introduces the term "messy supply chains" for SCs that deviate from the above norms, CAS (Choi et al. 2001) presenting "wicked" (Rittel and Webber 1973) or "messy" problems (Ackoff 1981). This study contributes to SC theory by exploring non-conventional SC structures. It furthermore contributes to managerial practice by providing indications for the management of such SCs, particularly in the context of HL. There is growing demand for disaster relief, and therefore for HL (Thomas and Kopczak 2005, Moe et al. 2007), making the efficient and effective management of these SCs paramount. Appropriate research questions have been detailed above.

Theory development was achieved through the development of a conceptual framework, which was based on the review of theory in the literature. This framework consists of five characteristics that have been determined to be prominent in MSCs based on literature on wicked and messy problems. This framework is then explored in the context of HL. It has previously been suggested that HL presents a wicked problem (Tatham and Houghton 2011).

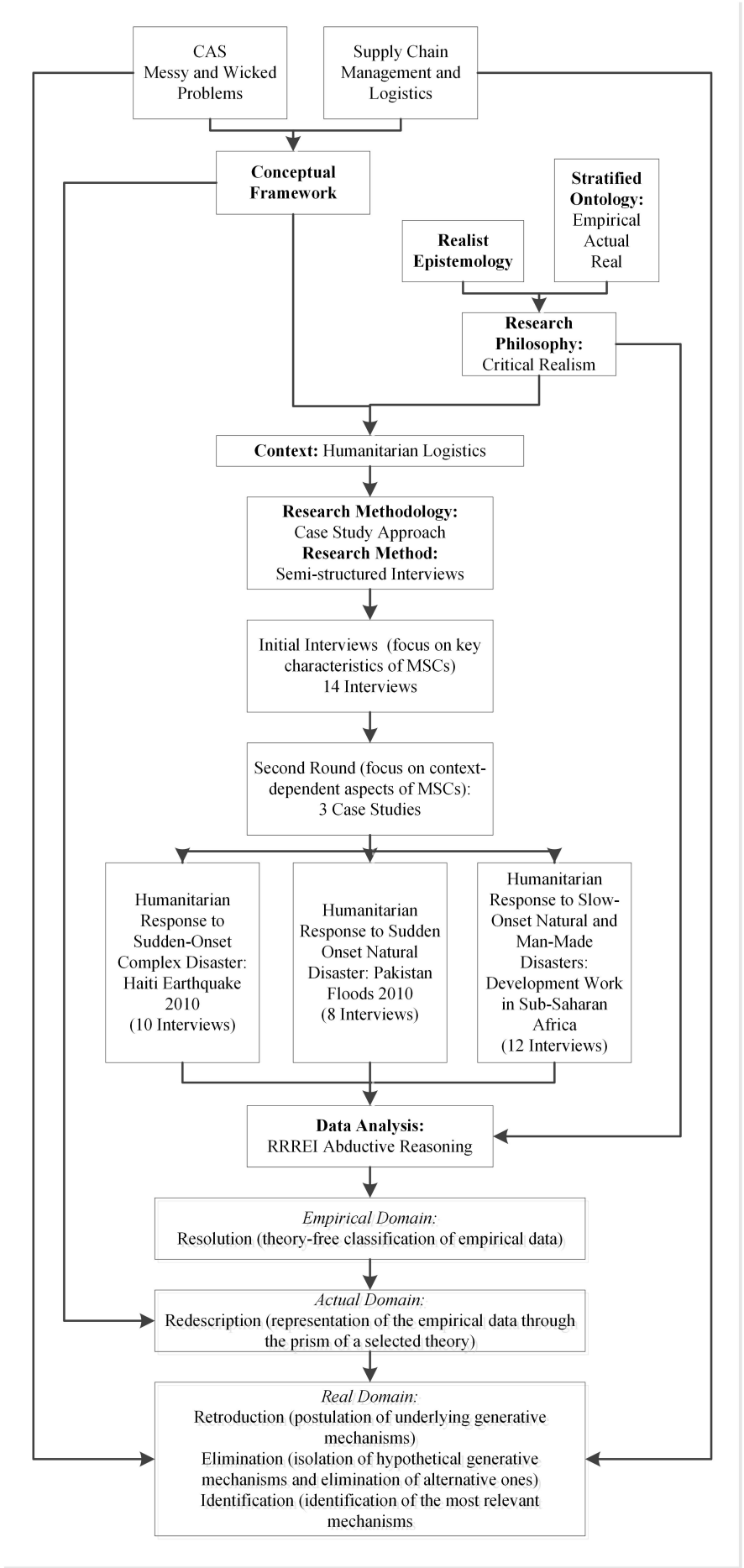


Figure 19: The Research Framework (author's own figure)

Choice of methodology depends primarily on the underlying research paradigm that is employed (Guba and Lincoln 1994). The critical realist approach employed in this research has been introduced, informing the choice of methodology. Realist theory rejects the notion of a clear linear view of causation as a regular succession of events, as consistent regularities are seen to only occur in closed systems that exhibit both a stable causal power and are situated in an unchanging external environment (Bhaskar 1975, Harré and Madden 1975). However, in open systems, a range of different outcomes can be elicited by the same causal power, as any future event is triggered not only due to underlying structures and mechanisms, but is also generated by the influence of conditions that consist of a complex interplay of spatio-temporal relations with objects and their inherent causal powers and liabilities (Sayer 2000). Techniques and strategies from commercial SC management have been applied to the humanitarian context in many instances, but this has not always resulted in the desired outcomes as expected based on commercial experience (Day et al. 2012). Therefore, the context of HL exerts a causal power upon the structures and mechanisms of SC management. This complex relationship is explored through primary research that aims to gather in-depth information on humanitarian responses following the approach outlined by RRREI (Bhaskar 1994, Mingers 2000a, Rotaru et al. 2014).

Data collection and analysis approaches are discussed as part of this chapter. A series of 44 semi-structured interviews have been conducted with individuals involved in humanitarian responses, including logisticians and non-logisticians at both head-office and field level from a range of humanitarian organisations. Through purposeful sampling based on findings from the first round of interviews, case studies were developed on three different humanitarian responses to gain more in-depth information on the particular context of these responses, constituting the *Empirical* domain and the *Resolution* phase in RRREI. The qualitative data collected was then analysed through two rounds of coding and thematic analysis. Through the prism of the conceptual framework, *Redescription* in the *Actual* domain was achieved by coding the empirical data with the aid of the characteristics of MSCs identified in the framework. Subsequent thematic analysis occurs in the *Real* domain, postulating underlying generative mechanisms in *Redescription* of the component causes found in the empirical data, *Elimination* of alternative causes and finally, *Identification* of the most relevant mechanisms (Bhaskar 1975, Bhaskar 1989, Bhaskar 1994, Pearce 2007). Research methods are introduced below. Analysis and discussion of the data are discussed in subsequent chapters.

Conclusions and recommendations for further research are presented in the final chapter of this thesis. This is the final step of Mentzer and Kahn's (1995) research framework for logistics that has been followed in the development of the research framework (Figure 19).

3.4 Research Methods

Research studies can employ a single method for data collection and analysis, making them mono method studies, or multiple methods (Dane 1990, Frankfort-Nachmias and Nachmias 1992, Norton and Allinson 1995, McNeill and Chapman 2005). The customary main differentiation in regards to research method is between quantitative methods which produce numerical data, and quantitative methods that refer to any form of non-numerical data (Saunders et al. 2012). Fundamentally, quantitative methods are usually associated with deductive studies and positivism, while qualitative methods are more in line with an inductive approach and Interpretivist philosophy (Bryman 2012). However, there is mounting criticism of this distinction, as it is increasingly regarded as artificial, often ambiguous and of doubtful usefulness in the modern research environment (Layder 1993, Scarbrough and Tanenbaum 1998, Bryman and Bell 2007). In this research, it is acknowledged that difficulties persist with the classic distinction between qualitative and quantitative research, however, the understanding is that the disparities are much more significant than a mere division into numeric data and recorded words (Bryman 2012, Saunders et al. 2012). The entire approach to a research undertaking differs according to the chosen method. Key differences are summarised in Table 7.

It is apparent that there are fundamental differences in the research approaches and philosophies that are most commonly aligned with quantitative and qualitative methods. This is echoed in literature on research paradigms highlighting the close relationship interpretivist paradigms have with qualitative methods and positivist ones with quantitative methods (Carson et al. 2001). Indeed, the choice of paradigm has been described as instrumental in selecting appropriate research methods for a particular study (Guba and Lincoln 1994, Lincoln et al. 2013). The fundamental understanding of the nature of knowledge and enquiry prompts decisions regarding appropriate methods (Collis and Hussey 2003, Blaikie 2004, Donmoyer 2008, Kelemen and Rumens 2008).

Table 7: Contrast between Quantitative and Qualitative Research Methods (adapted from Bryman and Bell, 2007)

	Quantitative	Qualitative
Principal research approach	Deductive	Inductive
Principal epistemology	Positivism	Interpretivism
Principal ontology	Objectivism	Constructionism
Data collected	Number	Words
Point of view	Researcher	Participants
Proximity to data	Researcher distant	Researcher close
Development of theory	Theory testing	Theory is emergent
Mode of inquiry	Structured, static	Unstructured, dynamic
Focus on	Hard, reliable data	Rich, deep data
Vision	Macro	Micro
Study environment	Artificial setting	Natural setting

Unlike positivism and interpretivism, critical realism does not imply an incompatibility with certain research methods, nor does it display an endorsement of others; on the contrary, flexibility in the choice of methods is emphasised so as to find the most suitable one for a particular enquiry (Sayer 2000). However, it is essential to acknowledge the critical realist focus on social systems that are open and complex, and the rejection of unnecessary reductionism (Sayer 1992, Collier 1994). Therefore, while being informed by the paradigm employed in this research, it is in fact the subject of the study that determines the choice of methods.

3.4.1 Research in Logistics and Supply Chain Management

In this area of research, positivism is employed most frequently as a research paradigm, resulting in a high reliance on quantitative methods (Meredith et al. 1989, Gammelgaard 2004, Frankel et al. 2005, Pilkington and Meredith 2009). Preferred research methods in logistics and SC research are surveys or case studies (Burgess et al. 2006). An analysis of literature concluded that while there is a strong focus on survey research, there are also significant amounts of simulation and modelling based research, as well as a small but growing number of case studies or action research methods (Craighead et al. 2007). There is a lack of acceptance of alternative research methods as

they are habitually deemed less rigorous than surveys or modelling (Frankel et al. 2005). Qualitative research has previously been afforded comparatively little respect, as it is not supported by an appropriate research paradigm due to the dominance of positivism (Gammelgaard 2004).

It is imperative to incite the utilization of manifold methodologies, which can supplement each other and as such advance the understanding of SC management (Carter and Ellram 2003). To address the extensive diversity of research questions, no one methodology should be disregarded as long as it is sound and leads towards new contributions to knowledge (Frankel et al. 2005). The utilisation of a variety of methods should be encouraged because quantitative studies can be more controlled and generalizable, whereas quantitative studies present a higher degree of realism, thus providing opportunities for varied perspectives on complex research problems (Golicic et al. 2005). This relates to a wider debate on rigour versus relevance in logistics and SC research, as well as larger areas of operations and indeed business research, as it is maintained that empirical research can become more relevant if a wider range of methodologies is employed (New and Payne 1995, Gammelgaard 2004). To advance the discipline, both qualitative and quantitative methods have to be used, as the dominance of mostly survey research does not adequately capture its full depth. To expand the knowledge base of the discipline, researchers need to appreciate good research outside of the main stream (Frankel et al. 2005).

Recently, there has been a growing acknowledgment of the value of more varied methodologies to further a holistic understanding of the discipline (Carter and Ellram 2003). As they are slowly gaining more momentum and the benefits to relevance are being recognised, qualitative methods are becoming more common in SC research. Theory development and the predominant positivist paradigm that is implicitly being employed in SC research are now being questioned and these discussions are opening up new possibilities. The relevance to practitioners has increased with the better use of empirical research in SC management (Craighead et al. 2007). Nevertheless, research struggles to combine rigour and relevance, particularly in such a traditionally practical discipline with comparatively little theoretical background (New and Payne 1995).

The variety of methods, as well as the array of issues addressed by research is expanding, increasing the variety, rigour, and practical applicability of results, but there remains much room for improvement (Craighead et al. 2007). The complexity of real world problems is difficult to address through academic research and many studies tend to oversimplify (New and Payne 1995). The wider context of SC management as

evident in its considerable impact upon society has to be the subject of further investigation; to allow the academic research agenda to be driven solely by commercial interests is to limit the field of research and its potential benefit to the world at large (New 1997).

3.4.2 Research in Humanitarian Logistics

Within the area of HL, there has also been considerable debate on appropriate research methods and their application to this particular context. This has become especially pertinent with the establishment of the dedicated *Journal of Humanitarian Logistics and Supply Chain Management* in 2011 as this journal strives for research that is both rigorous and relevant to academics, as well as practitioners (Kovács and Spens 2011, Kovács 2012). At the very beginning of this journal, an e-mail survey of its editorial board members was conducted; the findings of this research highlighted the general scarcity of empirical research, especially when considering the quality of such research, and also revealed criticism of the high reliance on quantitative research methods, as this can lead to solutions that are correct on paper but impossible to implement in the highly complex environment of HL (Kovács and Spens 2011). On the other hand, it would be wrong to dismiss quantitative data as unsuitable for the humanitarian context. On the contrary, Pedraza-Martinez et al. (2013) report positive feedback from practitioners upon being presented with quantitative information, as these managers felt they were finally able to successfully synthesise the challenges they encountered in their daily operations.

A key concern in the area of HL is the ability to engage with practitioners and to communicate research results to them. This is stated as a particular aim of the *Journal of Humanitarian Logistics and Supply Chain Management* (Kovács and Spens 2011) and has been further strengthened with a subsequent focus on outreach, combined with calls for more empirical research (Kovács 2012). This echoes similar initiatives to further engage with the community of practitioners and to emphasise both rigour and relevance within the larger area of logistics research (Gibson et al. 2004, Mentzer 2008). However, it is seen as a particularly pertinent issue in HL because of the great importance of improved practice not merely for financial reasons but also to save lives and livelihoods (Van Wassenhove 2006, Kovács and Spens 2009, Pedraza-Martinez et al. 2013, Leiras et al. 2014).

Lappenbusch (2006) provides a review of the suitability of different research methods to HL. He outlines the difficulties of ethical experiments in this area of

research. Survey research is widely regarded as valid and is easily accessible for practitioners, but access to respondents is difficult, the non-response bias can be significant, and misunderstandings can be expected in a multi-cultural and highly fragmented environment. The difficulty with gathering large amounts of data makes a grounded theory approach impractical. While action research is desirable, as it provides immediately applicable results, it also requires researchers to be experts in the field and the prior existence of a strategic direction. Even though empirical work in this research area is difficult, more empirical research is highly desirable for improved and more relevant studies within HL (Kovács and Spens 2011, Kunz and Reiner 2012).

In concordance with the general tendency of logistics and SC research to be focussed on quantitative studies, a recent comprehensive review of HL literature has found modelling and simulation to be the most prevalent research methods, utilised by nearly half of the papers in their sample, followed by conceptual studies and case study research (Kunz and Reiner 2012). This confirms the findings of earlier literature reviews that analysed the usage of different research methods (Altay and Green 2006, Natarajarathinam et al. 2009). The authors furthermore echo the call for more empirical research that has been expressed numerous times (Kovács and Spens 2007, Kovács and Spens 2009, Natarajarathinam et al. 2009, Pettit and Beresford 2009, Pedraza-Martinez et al. 2011), adding a particular emphasis in requesting cross-organizational case studies and surveys (Kunz and Reiner 2012).

This research aims to address the paucity of empirical research in HL by engaging in primary data collection and furthermore is concerned not merely with a single-organisation case study, but with explaining issues across multiple agencies. Given the previous discussion, the research paradigm followed in this study does not preclude any research method, relying instead upon the researcher to judge the suitability to the subject matter under investigation (Sayer 2000).

3.4.3 Case Study Approach

An intensive and detailed analysis of a single case, for example a particular event, an organisation, a person, a community or indeed a variety of others, is called a case study, an approach often, but by no means exclusively, linked to qualitative research (Bryman 2012, Yin 2014). According to Yin (2014) a case study is *"an empirical enquiry that investigates a contemporary phenomenon within its real life context"* (p. 14). While all research operates in terms of a certain unit of analysis, in contrast to survey research, case study research focuses on the investigation of a small number of

cases in great depth. However, it differs from experimental research in that there is no direct control of any variables present in the cases under investigation, as naturally occurring rather than artificially created situations serve as the basis for the construction of cases (Hammersley and Gomm 2000). Case studies are characterised by the collection of contextually rich data, thus often favouring qualitative data sources such as interviews, observation or document analysis as form of secondary data analysis (Easterby-Smith et al. 2012, Yin 2014). This focus on rich data that derives from a particular context makes case study research a particularly promising approach for the study of complex social phenomena in which a variety of variables, some of them unknown to the researcher, shape particular responses or outcomes in a network of fuzzy interactions (Stake 2000, Flyvbjerg 2013). However, due to the exceedingly large amounts of data involved and the time and skill the collection and analysis of this data necessitate, case study research is not an efficient form of research, a disadvantage outweighed by its unrivalled ability to prevent a disconnect between research and reality (McCutcheon and Meredith 1993). This makes case study research a particularly desirable approach in the field of HL, where managerial applicability is required in an effort to not only prevent monetary loss, but also to curb human suffering (Van Wassenhove 2006).

From the 1980s onwards, case study research has been employed in the area of operations management, predominantly for exploratory studies or in descriptive ways (McCutcheon and Meredith 1993). By now it has become a very widely accepted method with some heralding the past two decades as a "renaissance" of case study research in operations management (Stuart et al. 2002, Voss et al. 2002, Ketokivi and Choi 2014). With the growing recognition of the importance of a variety of research approaches in logistics, this too has become an area in which case study research is increasingly debated (Ellram 1996, Naslund 2002). Indeed, a questionnaire of leading logistics and SC experts revealed that case studies were ranked alongside surveys as the preferred research methods (Larson and Halldórsson 2004); a preference that is not necessarily reflected in the number of publications in relevant journals (Aastrup and Halldórsson 2008).

The legitimisation of case study research in operations management (McCutcheon and Meredith 1993, Voss et al. 2002) has built primarily upon the work of Eisenhardt (1989) and Yin (1989, 1993). However, the omnipresence of their approach in operations management has recently garnered critique as the notion that case study research derives its value primarily from the identification of constructs that can then be

tested through other methods has been rejected, highlighting the value case study research has in its own right (Ketokivi and Choi 2014). Furthermore, different possible approaches have been highlighted, contradicting Eisenhardt (1989) by not setting cases based on pre-conceived notions, as well as by extolling the virtue of single cases (Spring and Santos 2015). Nevertheless, there is great value to be found in clearly structured approaches to case study research, as these serve to counter some of the criticism levelled at this approach, labelling it "ad hoc" research and questioning its usefulness beyond the mere exploration of new research areas (Ellram 1996). In particular, repeated criticism regarding the perceived lack of rigour in case study research has been countered with conventions for its application being set out building upon the previously mentioned works of Eisenhardt (1989) and Yin (1989, 1993), but focussed specifically on operations management, with guidelines for both inductive and deductive case studies (Barratt et al. 2011). Figure 20 presents the research process of case study research employing multiple case studies that are first analysed individually and then focusing on theory modification based on cross-case analysis. Conversely, Eisenhardt (1989) encouraged theory-building research, that does not seek to validate theory or to test hypotheses through the use of case studies.

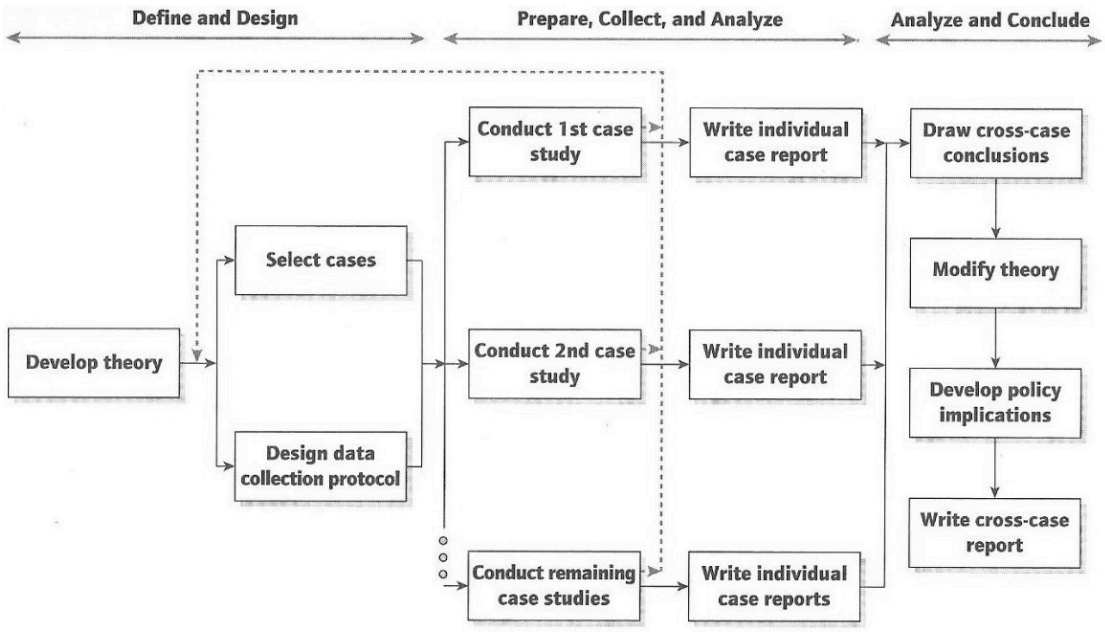


Figure 20: Case Study Research (Yin 2009, p. 57)

While case study research is prevalent in both operations management and logistics research, it is usually characterised by a lack of epistemological justification (Aastrup and Halldórsson 2008), a phenomenon that is not only restrained to these areas of research, but has been observed in other disciplines as well (Meyer 2001). While it is

not constrained to this research paradigm, case study research has been highlighted as particularly suited to a critical realist perspective, as it enables the conceptualisation of the causal power of structures that are so essential in the realist view of causation (Tsoukas 1989, Aastrup and Halldórsson 2008, Easton 2010). The desire *"to understand generative mechanisms that underlie practice and performance"* (Aastrup and Halldórsson 2008, p.759) is the underlying motivation of critical realist research, thus revealing links between the *Real* domain of mechanisms and structures with the *Actual* domain that generates particular events and outcomes. Case studies do not solely describe empirical events, but due to the richness of the data collected, they can also be used to trace linkages and causal powers in order to uncover the actual and the real domain (Easton 2010).

Another particular strength of case study research within the critical realist paradigm lies in the ability to uncover causes and causal powers in open systems, such as SCs, without overly relying on prediction, but focussing on explanation through the abductive reasoning process that allows the constant oscillation between the *Actual* and the *Real* domain, thus unveiling potential structures and causal powers and through the process of elimination of alternatives eventually unveiling the underlying reality (Mingers 2000a, Aastrup and Halldórsson 2008). Critical realism acknowledges that social phenomena are dependent upon the context within which they occur (Sayer 1992). As case studies frequently utilise interviews as the sole or predominant method of data collection, they are well-placed in accounting for these contextual elements, as the data are gathered directly from agents within the open system under investigation and therefore include the causal powers and effects of meanings that are ascribed by said agents (Aastrup and Halldórsson 2008). It is important to note that under the critical realist paradigm, the researcher is not the producer of the identified causal laws, but merely gains access to them through the engagement with the open systems under investigation (Tsoukas 1989).

Both inductive and deductive approaches to case study research are possible and both are employed frequently (Barratt et al. 2011). Due to its solid foundation within real organisational problems and issues, case study research can be an excellent source of theory development (MacCarthy et al. 2013). However, Voss et al. (2002) insist that even an inductive approach requires a priori understanding of the general constructs under investigation and the relationships between them. As the importance of theory-driven empirical research grows in order to enable further understanding of highly complex operations management topics, so does the importance of theories

underpinning case study research (Melnyk and Handfield 1998). Regardless of the inductive or deductive nature of an enquiry, the inclusion of established theories, often from fields outside of operations management, lends validity to the conclusions drawn from the data (Barratt et al. 2011). With this focus on theory in conjunction with the highly practical approach of case study research, Spring and Santos (2015) suggest abductive reasoning as the ideal way to balance theory and practice and thus rigour and relevance of case study research. As seen in Figure 21, Ketokivi and Choi (2014) differentiate between theory testing, theory generation, and theory elaboration, aligning the latter with abductive reasoning, the iteration between general theory and the empirical data created in the case study research. As previously outlined, this is the approach taken in this thesis.

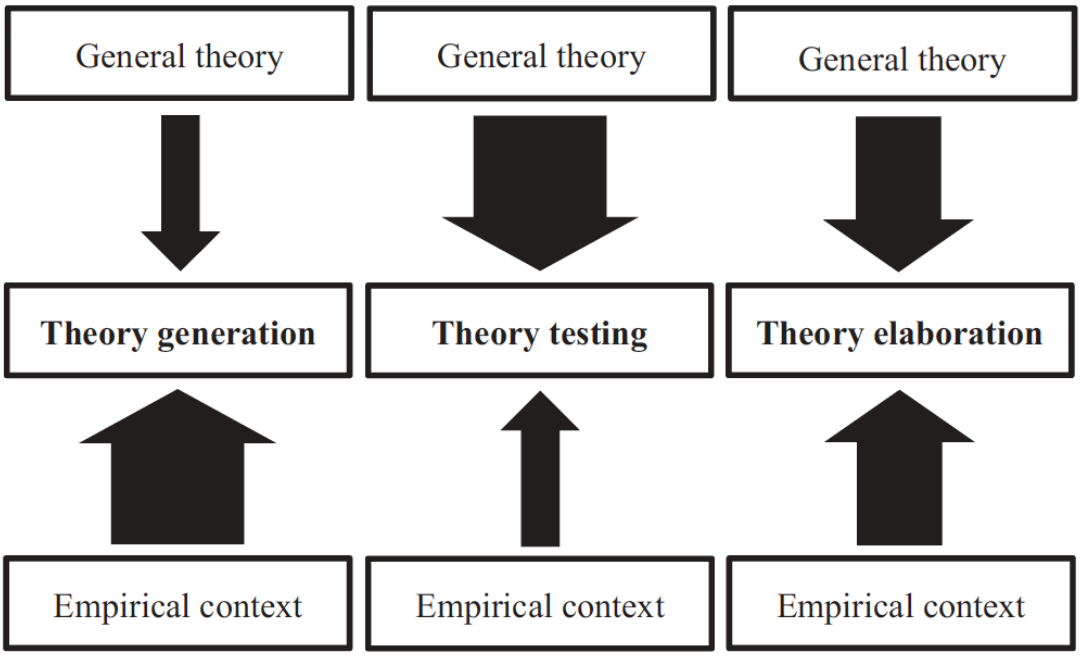


Figure 21: Three modes of conducting case research (Ketokivi and Choi 2014)

3.4.4 Setting Cases

The nature of the cases in case study research is of great importance as the content of this mode of study is concerned with the emic, what is happening and important within the boundaries of the case, rather than the etic, the hypothesis or issues previously identified by the researchers (Stake 2000). Cases are generally chosen for theoretical reasons (Eisenhardt 1989, Yin 1989, Meredith 1998), for example selecting cases that are expected to yield polar opposite results (Miles and Huberman 1994, Yin 2014), or studying leading companies to define useful benchmarks (Choi and Hong 2002, Fisher 2007), prompting a focus on the careful selection of cases, particularly in

theory-building studies (Barratt et al. 2011). While Eisenhardt (1989) advocates the use of between four and ten case studies, single case studies can result in a greater depth and have proven to be particularly useful in longitudinal studies or in situations of unique data access (Voss et al. 2002, Yin 2014).

This tradition of defining cases at the beginning of a study before then testing or generating theory assumes that the relevant variables by which to select cases are previously known (Spring and Santos 2015). In operations management research, the natural unit of analysis has predominantly been a particular plan or a function (Pilkington and Meredith 2009). However, with globalisation, the dispersion of activities due to increased information technology usage, and the rising importance of SCs as the origin of competitiveness, cases have become more difficult to define (Spring and Santos 2015). Despite the predominance of pre-defined cases, Flyvbjerg (2013) presents the failed attempt to find an extreme case as a fortuitous circumstance that lead to the study of previously unexpected phenomena.

In the case of HL, cases could for example be individuals involved with HL, groups of beneficiaries, humanitarian organisations, or particular countries. As there is little prior knowledge as to the causal powers behind the MSCs under investigation, it is impossible to select the proper unit of analysis with reasonable confidence. Therefore, a different approach was taken in this thesis. HL is treated as a setting in which to elaborate theory and to develop cases, with a setting being defined as *"a named context in which phenomena occur that might be studied from any number of angles; a case is those phenomena seen from one particular angle"* (Hammersley and Atkinson 2007, p.32). Rather than being seen as empirical units that are found, cases are regarded as theoretical constructs that are made as part of the research, a process known as casing (Ragin and Becker 1992). This flexible approach is employed to remain open-minded regarding the unit of analysis that offers the most insight (Spring and Santos 2015).

In this thesis, casing takes place after insights gathered through an initial round of interviews with individuals within humanitarian organisations. These individuals were initially contacted at a variety of organisations of different sizes and with different foci. Logisticians, as well as non-logisticians were involved to achieve a broad range of perspectives. Thus, stratified sampling was employed, as well as some snowball sampling as interviewees directed the researcher towards their own contacts (Marshall and Rossman 1999, Carson et al. 2001, Wengraf 2001). Due to time and resource constraints, only humanitarian organisations were contacted. While it is recognised that it would be desirable to also gather data from other stakeholders such as beneficiaries

and donors, this was not possible as part of the current study. Based on the findings of the initial round of interviews, three distinctive case studies were developed, taking the humanitarian response as the unit of analysis. The respondents in the initial round of interviews encouraged the choice of the unit of analysis. The individual cases were noted as being particularly interesting humanitarian responses that showcased different aspects of HL. Interviewees were then found using a combination of snowball sampling and theoretical sampling, as some were referrals from interviewees in the initial round and others were contacted directly based on their involvement with the particular humanitarian response (Saunders et al. 2006, Bryman 2012). Case studies were geographically, as well as temporally bounded. A detailed description of the boundaries of each case study can be found at the beginning of each case analysis section in Chapter 4.

Three case studies were conducted based on three distinctive humanitarian responses, two of which were emergency responses, while the third was set in a development scenario. The three case studies were:

1. Emergency humanitarian response to the January 2010 earthquake in Haiti
2. Emergency humanitarian response to the July 2010 floods in Pakistan
3. Developmental humanitarian response to multiple disasters in sub-Saharan Africa from 2000 onwards

Interviewees in the initial round determined the choice of these cases. Haiti and Pakistan were highlighted as two natural disasters in the same year that resulted in very different responses from the international humanitarian community, thus forming interesting divergent cases. The two emergency response cases lay several years in the past at the time of data collection, which interviewees felt was essential for a comprehensive assessment of HL, as it was now possible to reflect on lessons learned. The developmental case study has a longer time horizon, as it is more difficult to immediately assess a response to slow-onset disasters, particularly with the focus being on longer-term improvements and capacity building.

In the initial round, 14 representatives from twelve different humanitarian organisations were interviewed. A conscious effort was made to identify interviewees in large, multinational humanitarian organisations that generally enjoy a higher level of awareness, as well as those in smaller organisations that coordinate their missions from only one country or region, and are globally less well known. This is an element of pre-determining characteristics that are expected to have an impact on the research, but this approach was only taken for the initial round of interviews during which potential

interviewees were identified solely by the researcher, as subsequently the interviewees' and the data collected shaped the selection of the case studies in a casing approach (Ragin and Becker 1992, Spring and Santos 2015). As the nature of humanitarian work makes it difficult to quantify organisational size in terms of financial figures or employee numbers, the global reach of their operations was taken as a proxy for the size of the organisations. Most organisations have humanitarian activities in multiple countries, but they differ significantly in the base of their management and also the interactions they have with potential donors. For the purpose of this research, those with a multinational presence on the donor-facing side were classified as "large" organisations, whereas those who relied predominantly on management and donations from one country were classified as "small" organisations. Organisational types correspond to the ones previously introduced in section 2.3.3. Where not explicitly stated in an organisation's material (for example their website, annual reports), these were assigned based on the allegiances and values expressed not only by the respective interviewees representing this organisation, but also through an organisation's publications.

Table 8: Summary of Organisations and Case Studies

Organisation	Size	Type	Initial Interviews	Case 1: Haiti	Case 2: Pakistan	Case 3: Africa	Total Cases
1	Large	Governmental	Y				**1**
2	Large	Dunantist	Y	Y	Y	Y	**3**
3	Small	Dunantist		Y			**1**
4	Small	Wilsonian	Y		Y		**2**
5	Small	Faith-Based	Y			Y	**2**
6	Small	Faith-Based	Y		Y	Y	**3**
7	Small	Faith-Based		Y		Y	**2**
8	Large	UN	Y			Y	**2**
9	Large	Dunantist	Y	Y	Y		**3**
10	Small	Faith-Based				Y	**1**
11	Large	Governmental	Y		Y	Y	**3**
12	Small	Wilsonian	Y	Y			**2**
13	Large	UN	Y	Y	Y		**3**
14	Small	Governmental	Y	Y		Y	**3**
15	Large	Dunantist	Y	Y	Y		**3**
16	Small	Wilsonian		Y			**1**

In total, individuals from 16 different organisations were interviewed. Most organisations were represented in more than one case study. Table 8 summarises the organisations and their involvement in the different case studies. To preserve the anonymity of participants, particularly within the small organisations, the decision has been made to not identify the organisations involved in this research, but to assign numbers to them instead. In some organisations, more than one representative of an organisation was interviewed for a single case study, thus the total for Table 8 and Table 9 comes to 39, whereas 44 interviews were conducted in total.

Seven large organisations and nine small ones were involved in the interviews. On average, large organisations were involved in more case studies than small ones, with the majority of large organisations having representatives interviewed for all 3 cases. While this does not constitute a representative sample, a tendency can be observed of mainly large organisations participating in interviews for Case 2, the emergency response to the July 2010 floods in Pakistan, whereas there is a fairly even split in the others, as summarised in Table 9. This issue will be discussed further in the subsequent chapter as part of the findings.

Table 9: Number and Size of Organisations whose Representatives Were Interviewed for Each Case Study

	Initial Interviews	**Case 1: Haiti**	**Case 2: Pakistan**	**Case 3: Africa**
Total	12	10	8	9
Small	5	5	2	5
Large	7	5	6	4

3.4.5 Semi-Structured Interviews

An interview is a conversation between two or more people that is conducted for a specific purpose (Kahn and Cannell 1957). Interviews are the most widely employed qualitative research method in general (Bryman 2012) and are among the preferred research methods of logistics researchers (Larson and Halldórsson 2004). Interviews are the method of data collection that is most commonly associated with case study research (Yin 2009). However, interviews are not synonymous with case study research, and indeed case studies may involve many other data collection methods (Ellram 1996). As with other qualitative techniques, interviews are concerned not with measurement, but with the understanding and the collection of rich data (Walker 1985). The richness of data that can be collected through interviews is particularly important in case studies

from a critical realist perspective, as it aids the understanding of causal powers (Aastrup and Halldórsson 2008). Sayer (2000) classifies interviews as an intensive research method, that is one that focuses on individual agents in particular contexts. He elaborates that while intensive research produces causal explanations, these are limited to the situations under investigation.

Interviews can be structured, unstructured or semi-structured (Saunders et al. 2012); examples of each of these three approaches are summarised in Table 10 (Ellram 1996). Each of the three types of interview research is described in more detail below.

In *structured interviews*, the interview tool remains fixed (Barratt et al. 2011). A strict interview schedule is administered by an interviewer who has to stick to the exact wording and order provided, with all interviewees being given exactly the same stimuli in the process of questioning so their replies can be aggregated, a method often associated with survey research (Bryman 2012). Social interaction with the researcher is very limited in this type of interview (Wengraf 2001).

Table 10: Types of interview research (Ellram 1996)

Unstructured	Semi-structured	Structured
• Conversational • Key information/ elite interview	• Ethnographic interview • Focus group • Individual biography • Critical incidents • Historical analysis	• Questionnaire (open ended) • Ranking/rating scales • Closed end "tests"

In *semi-structured interviews*, the interview tool is updated based on emerging data (Barratt et al. 2011). There is a broad interview guide with indicative questions to be covered, but departures from this guide are allowed, and indeed encouraged (Bryman 2012). This is particularly conducive to gathering a wide range of information (Wengraf 2001). While there are certain key topics to be covered, a flexible and adaptive interviewing style is used to encourage expression of uninhibited views, thus creating a holistic picture of the context under investigation (Hindle et al. 1995). While a list of questions exists, the researcher has some leeway in altering them and adding more questions as they deem necessary (Bryman 2012). Case study research is most commonly equated with semi-structured interviews, as these best suit the flexibility of cases (Easton 2010). It is important to balance a clear research focus with flexibility, as a strict adherence to prepared questions may actually inhibit successful data collection;

thus it is generally more conducive to management research to be guided by the interviewee in constructing a conversation that unearths all pertinent data (Stuart et al. 2002).

Unstructured interviews are most similar in character to ordinary conversations (Burgess 1984). They are highly informal and ordinarily used for exploratory study of a general area of internet without predetermined questions (Wengraf 2001). The interviewee is permitted to speak freely with minimal guidance from the researcher, allowing for diversification in topics, expanding upon the original intentions of the research in unexpected ways (Bryman 2012). In addition, less structure also minimises the bias from the researcher (Jones 1985). This type of interview can be described as an informant interview, compared to the respondent interviews in which the interviewer guides the conversation through their perceptions and experience (Easterby-Smith et al. 2012).

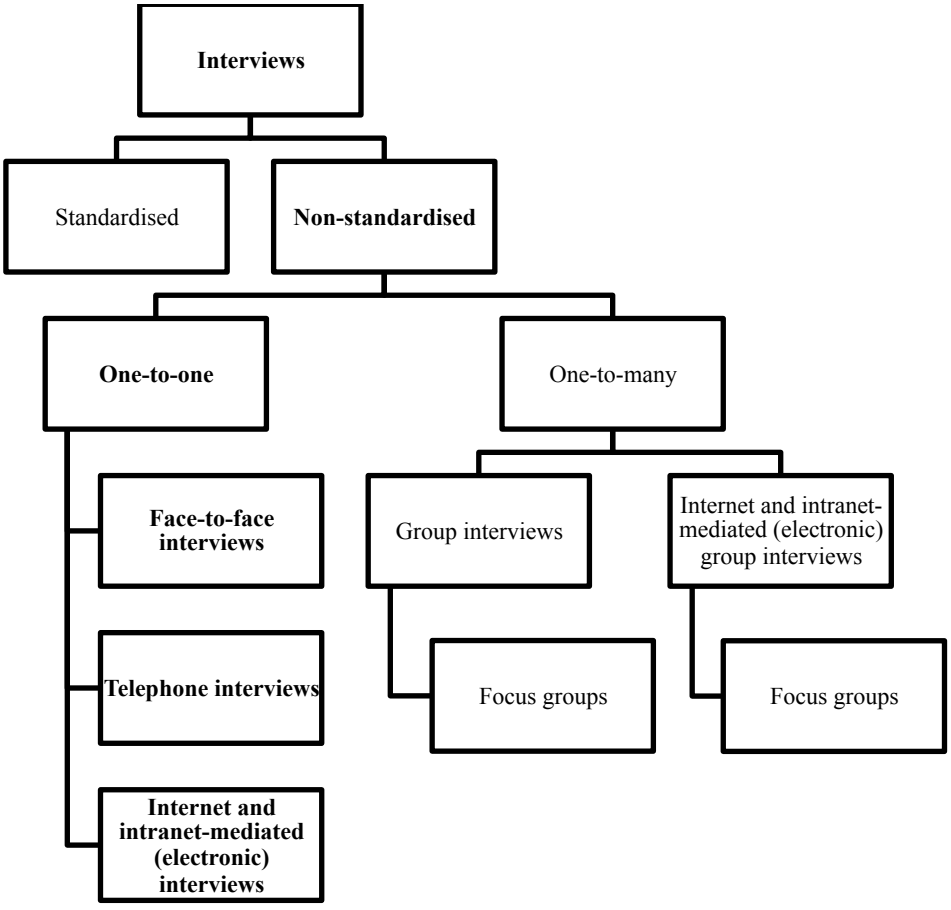


Figure 22: Forms of interview (Saunders et al. 2012)

In this thesis, semi-structured interviews were conducted. The flexibility offered by these is particularly important as the research aims to collect personal beliefs that would be difficult to capture in a rigid format. Several iterations of the interview guide

can be found in the appendices, demonstrating the changes made throughout the primary research in response to emerging information. The interviewees were initially contacted by e-mail to provide them with general information about the study conducted, to inform them of matters of confidentiality, and to obtain their consent in writing (Frankfort-Nachmias and Nachmias 1992). Different forms of interviews are summarised in Figure 22. In this study, non-standard interviews were conducted individually. Due to the geographical locations of the interviewees, the majority of whom are actively conducting humanitarian work around the world, some interviews were conducted face-to-face; some by telephone, and others were completed with the use of online technology. It was not feasible to conduct the interviews using the same method of communication in every instance. In each instance, the actual interview was pre-faced by a short oral introduction of the study and some small talk to build rapport with the interviewees (Wengraf 2001, Bryman 2012). With the consent of the interviewees, recordings were made for every interview and subsequently transcribed to form the basis of qualitative data analysis.

3.4.6 Data Analysis

The purpose of data analysis is to bring *"order, structure, and interpretation to the mass of collected data"* (Marshall and Rossman 1999, p. 150). Stuart et al. (2002) describe the process of qualitative data analysis as a challenge of making sense from chaos. Data analysis should not occur entirely separately from data collection, so as to analyse data concurrently with collection could prompt improvements in the data collection (Miles et al. 2014). This is of particularly great importance within a critical realist research paradigm utilising the abductive research approach detailed above. Therefore, time was taken after each interview to reflect upon the process, as well as the content of each interview, outlining emerging key themes and highlighting any necessary adjustments. These reflections then informed the further data collection.

The interview transcripts were entered into computer-assisted qualitative data analysis software (CAQDAS) NVivo for data analysis, as such technology provides a wealth of ways to organise and analyse the vast amounts of data collected in qualitative studies (Fielding and Lee 1991, Kelle et al. 1995). Despite some criticism that using CAQDAS can decontextualize data, the benefits of using the software were considered to outweigh the negatives (Bryman 2012). This allowed data analysis to occur in a thorough and efficient manner, which was essential given the large amount of rich data collected through the interviews (Miles et al. 2014).

According to the previously discussed stages of RREI, *Redescription* through the prism of the conceptual framework takes place during data analysis (Mingers 2000a, Rotaru et al. 2014). The empirical data that constitutes the *Empirical* domain is redescribed in the *Actual* domain by coding it with the aid of the characteristics of MSCs identified in the conceptual framework. Thus, the first level of codes applied in the data analysis is the five components of the framework. Subsequent thematic analysis occurs in the *Real* domain, postulating underlying generative mechanisms in *Redescription* of the component causes found in the empirical data, *Elimination* of alternative causes and finally, *Identification* of the most relevant mechanisms (Bhaskar 1975, Bhaskar 1989, Bhaskar 1994, Pearce 2007).

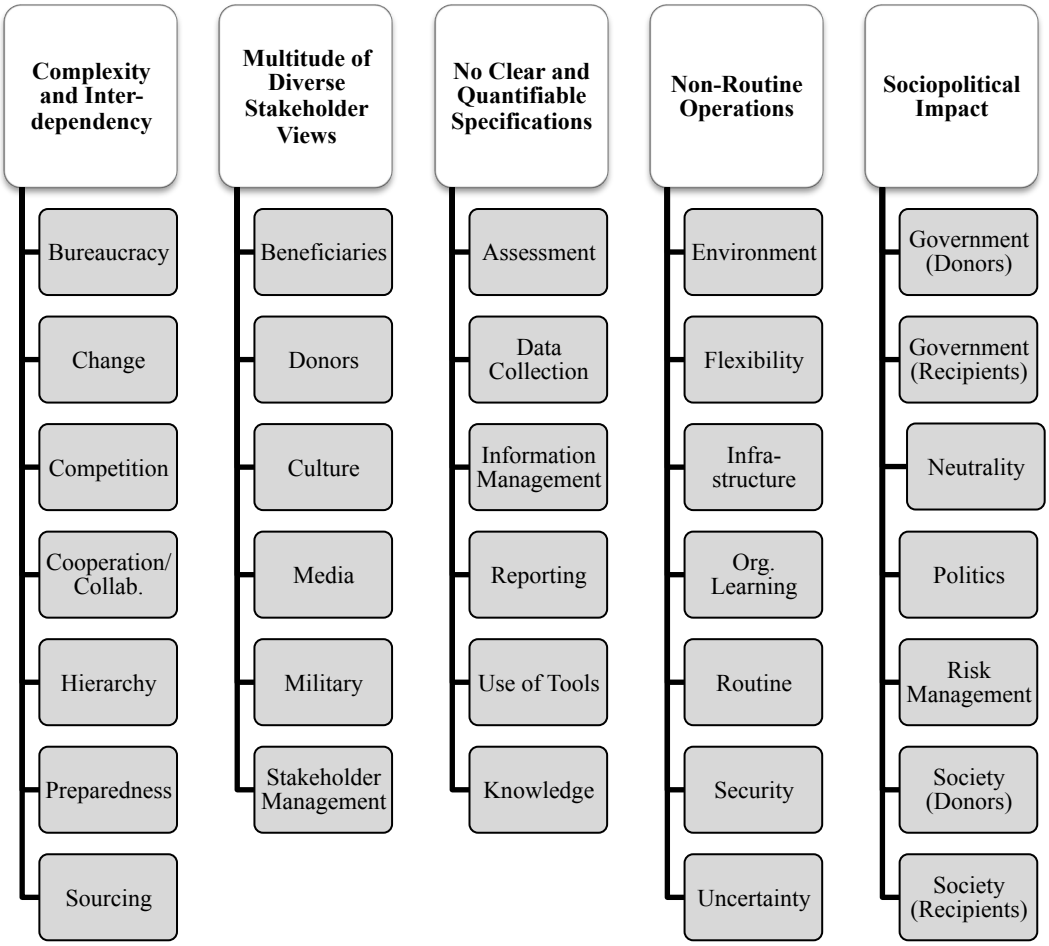


Figure 23: First and second level codes (author's own figure)

As data analysis progressed, more codes were developed, and hierarchies and Codes are *"labels that assign symbolic meaning to the descriptive or inferential information compiled during a study"* (Miles et al. 2014, p. 71). A code is a word or short phrase that *"symbolically assigns a summative, salient, essence-capturing and/or evocative attribute for a portion of language-based or visual data"* (Saldana 2013, p.

3). Figure 23 provides a list of the first and second level codes employed in coding the interview data. Each of the five components of the conceptual framework was observed in the interviews through various expressions that were listed and refined as data collection progressed and eventually formed the basis for the second level of codes. The codes used in the data analysis for this thesis thus stem from three sources: terms that emerged from the data, *in vivo* codes utilised by participants, and codes from existing theory (Corbin and Strauss 2008). They combine inductive (emerging from the data) and deductive (based on literature and theory represented in the form of the conceptual framework). In formulating the codes, care was taken to ensure their meaningfulness in relation to the coded data (the internal aspect) and their meaningfulness in relation to other codes (the external aspect) (Saunders et al. 2006). The codes were continuously revisited and altered where appropriate (Marshall and Rossman 1999). Each interview was coded on at least two separate occasions as recommended by Miles et al. (2014), revisiting the initial codes after several days to ensure internal consistency. To ensure that the codes were applied consistently, operational definitions of each code were developed, thus providing a clear guideline regarding the contents to be coded within each.

As data analysis progressed, more codes were developed, and hierarchies and analytical links emerged among them (Corbin and Strauss 2008). Miles and Huberman (1994) recommend revising codes throughout the course of a research project in order to capture emic issues (those that emerge from the study) in addition to the original etic issues as a researcher's understanding and field experience increases. Second cycle coding focused on the identification of patterns from which to develop larger themes (Miles and Huberman 1994, Marshall and Rossman 1999). Finally, data was condensed in matrix and network formats to enable further in-depth analysis of the data in order to identify *how?* factors that describe influence and affect, and *why?* factors that explain causation (Miles et al. 2014). The latter are particularly pertinent to the critical realist view of causation and are the focus of this thesis as it aims for an enhanced understanding of MSCs. While the case studies on different humanitarian responses were the focus of data analysis at first, cases were subsequently subjected to cross-case analysis in an attempt to identify similarities and differences according to local conditions, and to potentially increase the generalizability of the findings (Gomm et al. 2000, Schofield 2000).

Even though a conceptual framework was used to aid in the organisation and direction of the data analysis, no premature closure on the issues under investigation is

intended, as the abductive approach enables constant reflection and revision throughout the research, lending it a more grounded approach in which theory emerges from the data with the intention to identify causal relationships and to alter the conceptual framework according to the findings (Saunders et al. 2006, Bryman and Bell 2007). This is fundamental to RRREI and the abductive approach.

3.5 Trustworthiness

A major criticism of case study research has been related to its perceived lack of rigour (Stuart et al. 2002). This concern that has been addressed extensively by Yin (1989) who outlines four logical tests for judging case research regarding its construct validity, internal validity, external validity and reliability. This research aims to address all of these areas, as they are also a concern in logistics research (Mentzer and Flint 1997, Aastrup and Halldórsson 2008). However, this thesis follows the work of Lincoln and Guba and uses their criteria for the evaluation of qualitative research, namely trustworthiness and authenticity (Guba 1981, Lincoln and Guba 1985, Lincoln and Guba 1986). This section outlines how trustworthiness is achieved here. Trustworthiness consists of four criteria, namely credibility, transferability, dependability, and confirmability.

Credibility is of particular importance in critical realist research since it stresses the existence of multiple accounts of an aspect of social reality thus making it important that the findings are established to be credible (Bryman 2012). This has been achieved through respondent validation, seeking corroboration of the findings by gaining feedback from the participants in the study. Credibility parallels internal validity in the evaluation of quantitative research (Guba 1981, Lincoln and Guba 1985, Lincoln and Guba 1986). As indicated by Yin (1989), key informants have been asked to review the draft of the subsequent chapters that detail the findings and their discussion to ensure the correct understanding and interpretation. Comments from these informants have then been integrated into subsequent versions of those chapters. Internal validity is concerned with making proper inferences from the data (Ellram 1996) and the identification of causal relationships (Yin 1989, Aastrup and Halldórsson 2008), and thus of particular importance in case study research under a critical realist paradigm (Sayer 2000). It is suggested to conduct "pattern matching" (Yin 1989), demonstrating that actual data patterns match predicted patterns, further strengthening the confirmation by replicating these findings across similar cases (literal replication) or showing that these patterns do not exist in dissimilar cases (theoretical replication) (Stuart et al.

2002). This thesis presents the findings from several cases, thus allowing for theoretical replication. However, due to the messy nature particularly of the social activities within the open systems under investigation (Sayer 2000), prediction of patterns is not seen as expedient (Aastrup and Halldórsson 2008). While internal validity is thus not a primary concern, due to the abductive research approach, there is a constant iteration between proposed and identified patterns, between theory and empirical data, and in RRREI the Elimination phase deals with competing generative mechanisms to make sense of the data, thus adding to validity (Spring and Santos 2015). However, the key focus here is on credibility, which has been achieved through respondent validation.

Transferability parallels external validity (Guba 1981, Lincoln and Guba 1985, Lincoln and Guba 1986), which is concerned with *"the domain to which a study's findings or presumed causal relationships may be generalized"* (Stuart et al. 2002, p. 430), a major aspect of the overall criticism aimed at case study research because of the generally small sample size (Yin 1989, Gomm et al. 2000, Schofield 2000). Unlike survey research, case study research does not rely on statistical generalization, but on analytical generalization similar to experiments (Yin 1989). Case selection is not based on representative random samples (Eisenhardt 1989). Generalization does not occur from sample to population as in the case of statistical generalization, but from each case to a broader theory, which can—in the extreme—be possible from just one case as it uncovers reality (Stuart et al. 2002, Easton 2010). External validity is an issue to be addressed in the design phase of each study; here it is addressed by conducting multiple case studies and verifying patterns in these (Ellram 1996). However, from a critical realist perspective generalization is not a primary concern, and if external validity matters at all, it is for reasons of transferability and contextualization rather than generalization (Tsoukas 1989, Aastrup and Halldórsson 2008). Following Lincoln and Guba, the approach taken here is to focus on the contextual uniqueness of the cases studied, but aiming to produce thick description, a detailed account of the cases that can enable researchers to make an informed judgment about the possible transferability of findings (Guba 1981, Lincoln and Guba 1985, Lincoln and Guba 1986). This is achieved here through an extensive and detailed findings chapter that expresses the richness of the primary data and a detailed understanding of the cases.

Dependability parallels reliability in quantitative research (Bryman 2012), and is suggested to entail an auditing approach with high importance placed on keeping complete records of the research process (Guba 1981, Lincoln and Guba 1985, Lincoln and Guba 1986). This strongly resembles reliability, which is concerned with the

repeatability of the study and the ability to achieve the same results (Kidder and Judd 1986, Ellram 1996). Dependability is achieved here by maintaining a case study database, through the electronic storage of all data and notes that clearly document the research process and thus would allow future researchers to repeat the analytical procedures (Stuart et al. 2002). Furthermore, a case study protocol has been developed including the interview guide, as well as the procedures to be followed in using it (Ellram 1996). Despite the accurate record keeping, there has been no auditing process in place as only one researcher was involved in this research. This is in keeping with standards in qualitative research, where auditing is very rare because of its demanding nature (Bryman 2012).

Confirmability is concerned with ensuring that researchers have acted in good faith and not overtly allowed personal bias to sway the conduct of the research and reporting of the findings deriving from it (Guba 1981, Lincoln and Guba 1985, Lincoln and Guba 1986). This parallels reliability, which is concerned with the repeatability of the study and the ability to achieve the same results (Kidder and Judd 1986, Ellram 1996). As recommended (Stuart et al. 2002), this chapter has provided a detailed description of the data collection process. Furthermore, a clear chain of evidence has been established and the data analysis is extensively documented (Ellram 1996). This opens the work up to close examination and increases transparency (Ketokivi and Choi 2014, Spring and Santos 2015). Confirmability is achieved here by maintaining a case study database, through the electronic storage of all data and notes that clearly document the research process and thus would allow future researchers to repeat the analytical procedures (Stuart et al. 2002). Furthermore, a case study protocol has been developed including the interview guide, as well as the procedures to be followed in using it (Ellram 1996). The review of drafts by key informants is also seen to have contributed to a reduction of bias and to confirm that research was conducted in good faith.

3.6 Summary

This chapter has addressed matters of research philosophy and methodology. It provides the background to the primary research conducted as part of this thesis. In particular, it addresses questions of rigour and quality in the research process. Table 11 summarises key aspects of research philosophy and methodology in this thesis. A discussion of different research paradigms and the underlying epistemologies and ontologies has been provided at the beginning of this chapter, resulting in the

justification of the choice of the critical realist paradigm and the interpretivist epistemology and realist ontology it incorporates. In line with the critical realist paradigm, an abductive research approach was taken. Primary data was collected in 44 semi-structured interviews, and a case study approach was utilized, with an initial round of interviews and then three case studies of humanitarian responses that emerged from the previously gathered data in a casing approach. Interviews were conducted face-to-face, over the telephone or online; all interviews were recorded and transcribed to then be entered into NVivo for data analysis. Analysis took place through several rounds of coding, and occurred on a case basis, as well as across cases. Informed consent was given by all participants and anonymity was guaranteed throughout the study. A selection of key informants commented on drafts of the findings and discussion that is presented in the subsequent chapters.

Table 11: Summary of key aspects of research philosophy and methodology in this thesis

Research Paradigm	Critical Realism
Epistemology	Interpretivist
Ontology	Realist
Research Approach	Abductive
Research Methodology	Multiple case studies
Research Method	Semi-structured interviews
Unit of Analysis	Humanitarian response
Development of Cases	Casing
Timeframe	Cross-sectional
Data Analysis	Thematic analysis, cross-case analysis
CAQDAS	NVivo

Based on the process outlined here, primary research was conducted; data was gathered and analysed. Chapter 4 presents the findings from this data, split into the initial round of interviews and the three case studies on different humanitarian responses. Each humanitarian response is described in greater detail at the beginning of the relevant section of Chapter 4. RRREI forms the basis of this analysis. Chapter 4 is organised foremost by case studies and then by the first level codes employed in the data analysis, which correspond to the five elements of the conceptual framework for MSCs previously established. At first, each case is analysed individually, with cross-case analysis occurring in Chapter 5, thus answering a call for more cross-organisational

research in the context of HL (Kunz and Reiner 2012), as well as the more general call for more empirical research (Kovács and Spens 2011).

4 Findings: A Case-by-Case Analysis

This chapter addresses part of Research Objective 3: To design and carry out empirical research to explore the proposed conceptual framework in the context of HL. As detailed in the previous chapter, primary research for this thesis was conducted through a series of semi-structured interviews. These consisted of an initial round of interviews and three case studies focusing on particular humanitarian responses as the unit of analysis. This chapter reports the findings of the primary research. Section 1 highlights the findings of the initial round of interviews, whereas the subsequent sections focus on each of the case studies in turn. The sections are structured using the five aspects of the proposed conceptual framework developed in Chapter 2 (see Figure 24). These aspects form the headings for different parts of the report on the findings and are repeated in each section of this chapter.

There is no cross-case analysis in this chapter, as findings are reported strictly on a case-by-case basis. Chapter 4 is predominantly descriptive, which forms an important part of the analysis of multiple case studies, as it allows the researcher to develop insights by identifying unique patterns within each case and gaining familiarity with their peculiarities (Eisenhardt 1989, Voss et al. 2002, Simons 2009, Yin 2009, Barratt et al. 2011). The cross-case analysis can be found in Chapter 5. Cross-case analysis presents another important step in the research process, as overarching constructs are identified by the comparative study of the cases that represent different aspects of the overall context under investigation (Voss et al. 2002, Simons 2009). This process is in keeping with the suggestions of Yin (2014) who recommends that case study data is best presented by analysing each case separately, before embarking upon the final analysis, presenting results and overall contribution across the cases.

Within the critical realist approach taken in this thesis, the critical realist ontological domains play a major role in the collection and analysis of data. The primary data collected through the 44 semi-structured interviews with individuals involved in humanitarian responses as part of non-profit or governmental organisations represent the *Empirical* domain, corresponding to the *Resolution* stage of RRREI abductive reasoning (Rotaru et al. 2014). Within this chapter, *Redescription,* the second stage of RRREI occurs, representing the empirical data through the prism of CAS (Choi et al. 2001), “wicked" (Rittel and Webber 1973) or "messy" problems (Ackoff 1981) as a theoretical lens to enhance the understanding of the factors that affect the applicability of standard management approaches and the outcomes they elicit, thus moving into the *Actual* domain of critical realism (Rotaru et al. 2014).

The presentation of qualitative research findings entails unique challenges, as it does not have the same inevitability of logical flow that a quantitative study is bound to have through discussions of significance levels and numerical solutions (Silverman 2011). Pratt (2009) highlights two "perilous paths" in writing up qualitative research, namely a lack of balance between theory and data; and the temptation to emulate a quantitative narrative. Furthermore, he points out the importance of showing the reader the transition from the data to the interpretation of the data and encourages the inclusion of quotes within the body of the text instead of the presentation of data in elaborate tables that necessitate a constant transition between text and table and do not facilitate a thorough understanding of the data. Thus, it is considered best practice to include extracts of the data that present a summary of commonly expressed opinions or highlight particular areas of importance (Wolcott 2001). This approach is taken throughout this chapter to aid the understanding of the reader and also to ensure a logical flow of information.

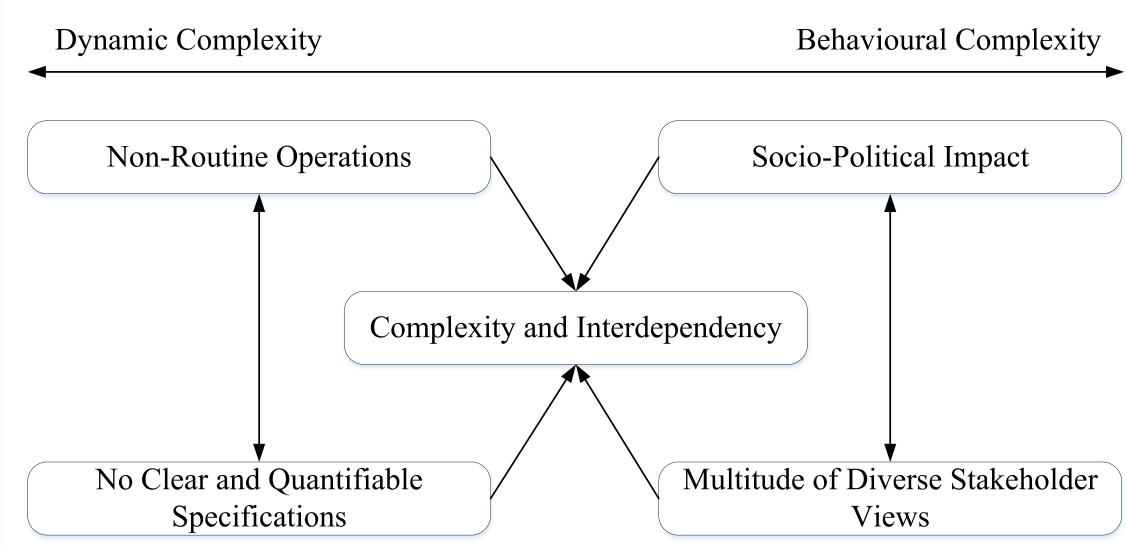


Figure 24: A conceptual framework for messy supply chains (author's own figure)

4.1 Initial Interviews

In the initial round of interviews, some pre-determined characteristics were used to identify prospective interviewees. This is in sharp contrast to the interviews conducted for the three case studies. The case studies emerged from the data gathered in the initial interviews and interviewees were contacted purely based on their involvement with the humanitarian responses under investigation. The humanitarian responses that form the three case studies were selected based on comments from the initial interviewees who noted these responses as examples that were of particular value and

interest within the humanitarian community. It was highlighted that developmental work in Sub-Saharan Africa was a long-lasting commitment that has seen great shifts in priorities and approaches employed, thus making it an interesting case study. Considering that the two disasters of the Haiti earthquake and the Pakistan floods both took place in the same year, interviewees highlighted the very dissimilar levels of public attention and funding the humanitarian responses received, creating operational environments that varied considerably. Thus, interviewees for the three case studies were targeted for their involvement in these particular humanitarian responses. However, for the initial round of interviews, the aim was to access a wide variety of perspectives and gather diverse views of HL through the lens of the framework for MSCs developed previously, so respondents were approached from vastly different organisations considering aspects such as organisational size, geographical location, and mission.

The initial round of interviews was conducted on the one hand to enable the process of casing based on this initial data, as particular humanitarian responses were highlighted by the participants as especially worthy of further investigation, rather than the researcher imposing case boundaries based on pre-conceived notions of the nature of appropriate cases (Ragin and Becker 1992, Spring and Santos 2015). Indeed, before the initial round of interviews, it was not apparent what the unit of analysis for this study might be. The focus on humanitarian responses rather than individual organisations or SCs was a result of the data gathered in this initial round, as informants attributed the aspects of MSCs evident in HL mainly to the context of particular responses rather than organizational culture or other elements inherent in the organisations or SCs. Furthermore, the initial round of interviews allowed the researcher to refine the interview guide, which is of great importance in semi-structured interviewing, as the instrument changes with use (Bryman and Bell 2007, Easton 2010).

4.1.1 Introduction

14 interviews were part of the initial round. They were conducted with individuals from 12 different humanitarian organisations, including seven large and five small organisations. Both male and female participants were interviewed, although there were significantly more males primarily due to the scarcity of female logisticians. The interviewees work at headquarters of humanitarian organisations or in the field. Furthermore, they were asked whether they self-identified as logisticians. The majority did, with the others having a close relationship with the logisticians within their

organization, for example medical personnel having joint responsibility for warehousing within a particular humanitarian mission, or financial managers overseeing procurement. Table 12 summarises this information for all participants in the initial round of interviews.

Table 12: Participant Characteristics in Initial Interviews

	Organisation Size	**Gender**	**Position**	**Job Description**
I1	Large	Male	Field	Other
I2	Small	Female	Field	Other
I3	Small	Male	Headquarters	Logistician
I4	Large	Male	Headquarters	Logistician
I5	Large	Male	Headquarters	Logistician
I6	Large	Male	Field	Logistician
I7	Small	Male	Field	Logistician
I8	Small	Male	Field	Logistician
I9	Small	Female	Field	Other
I10	Large	Male	Headquarters	Logistician
I11	Large	Female	Field	Other
I12	Large	Male	Headquarters	Logistician
I13	Large	Male	Headquarters	Logistician
I14	Large	Male	Headquarters	Logistician
SUMMARY	*5 small* *9 large*	*3 female* *11 male*	*7 headquarters* *7 field*	*10 logisticians* *4 other*

To protect their anonymity, informants are only identified by an alphanumerical code, where "I" stands for participation in the initial interviews and a number is assigned at random to each interview. Numbers have not been assigned according to the order in which the interviews were conducted, nor according to any characteristic of the interviewees. The same is true for the alphanumerical identifiers used for all respondents in the three case studies.

Informants were involved in a wide range of humanitarian responses across Asia, Africa, North America, South America, and Europe. Most had been involved in several responses before being interviewed and referred to all of these experiences throughout their interviews, often comparing and contrasting various humanitarian responses. Therefore the interviews provided insights from a host of different perspectives. In the following, the insights are presented according to the five aspects of the conceptual framework.

4.1.2 Complexity and Interdependency

Complexity and interdependency as the central part of the conceptual framework formed a considerable part of the interviews in this round. Areas of particular importance highlighted by the interviewees are displayed in Table 13.

Table 13: Complexity and Interdependency

Bureaucratic barriers	Hinder the establishment of efficient and effective HL
Collaboration and cooperation	Exist with other agencies in the light of constant competition
Hierarchy	Influences the position of logistics within the organisation and the interplay of decisions made at headquarters and in the field
Preparedness	Presents an area of tension between donor, humanitarian organisations, and potential recipients
Sourcing	Is the product of organisational beliefs as well as external factors

These five areas are addressed in this section incorporating quotes from individual interviews as illustrations of particularly pertinent issues.

Bureaucratic barriers are a frequently reported aspect of complexity in HL, especially related to importing goods. It is increasingly difficult to gain customs clearance as developing nations gain confidence and develop import legislation to establish their sovereignty in the international market (I9, I13). The extraordinary amounts of paperwork required result in long lead times for essential items, which can be both frustrating and costly for humanitarian organisations, as well as for the beneficiaries (I1, I6). In fact, it is seen as an important skill for humanitarian logisticians to be proficient in handling bureaucracy and to navigate complicated customs procedures (I7). There are also positive examples of governments and individuals showing flexibility in the face of disaster, and speeding up procedures for humanitarian shipments:

"In the Philippines last year the authorities said "We are so happy you are here, how can we help?" and they then determined that by putting three functions [...] together in one office and saying "this is the single office you have to go to; if you put this paper in front of us before the shipment lands you can have immediate access at the time it lands." (I13).

However, these examples remain the exception and there are recurrent complaints about excessive paperwork in all areas of the globe. While in the example given above, the humanitarian mission was seen as a deciding factor in facilitating preferential treatment, others observe the contrary and highlight the lack of motivation from government officials regarding the handling of humanitarian shipments:

"In a lot of countries it has really gotten difficult to import stuff, particularly when it's technical equipment. You know, they say that humanitarian assistance has priority and it's made much easier to import the stuff, but that's on paper. It doesn't always work, especially not when you urgently need to ship things, then stuff gets stuck because it's not commercial and it's not making anyone any money, so nobody cares" (I7)

Collaboration and cooperation between different humanitarian organisations was an important topic in all of the interviews; with informants acknowledging the potential such networks could have in improving HL and the outcomes for beneficiaries. In donor countries, the economic downturn has resulted in a much less *"vibrant community of charities"* (I3), which is perceived as a loss in terms of raising funds and awareness. While platforms to facilitate collaboration and cooperation in humanitarian responses exist, they are not used consistently, and many organisations have varying levels of involvement depending on the individual circumstances (I7, I8, I11, I13, I14). There is some reluctance by organisations that perceive themselves as being ahead of the curve in terms of HL development as *"it's not necessarily advantageous for us, but it can be advantageous for the others"* (I13). Despite the focus on doing good and achieving the best possible results for beneficiaries, humanitarian work is sees as *"quite a big competition"* (I9). As I11 phrases it pertinently

"That gets very political very quickly [...] there is so much arrogance, even within one agency. They all have to be seen to be pissing on all the trees."

This clearly demonstrates the barriers to cooperation and collaboration. Furthermore, informants questioned the usefulness of initiatives such as the United Nation's Logistics Cluster, regarding them as more work and meetings without any clear usefulness (I7, I13, I14) although they generally acknowledge the underlying good intentions:

"Listen, they obviously want to do good work [...] but you spend taking a lot of time up in meetings of which I've taken part of quite a lot and you're just literally going round in circles saying the same thing every meeting" (I8)

Despite this scepticism, participants acknowledge that the various competing organisations are invariably tied together in their work, particularly in relation to HL (I3, I7, I8, I11, I13, I14).

Hierarchy also contributes to the complexity and interdependency of HL as the standing of this function within humanitarian organisations leads to internal bureaucratic hurdles and creates inefficiencies (I1, I6, I11). Particularly important is the dichotomy between the field level and the headquarters as logistics usually involves both, eliciting an intricate balance between central control and local knowledge.

"You know what you need to do, but headquarters don't. So it's shit if you can't do it or you can't get the stuff. They don't know what it's like so some decisions are a bit shit, but you have to have some structure." (I1)

"The situation on the ground, that is constantly changing, so not everything can be done from [the organisation's headquarters]. It's a dynamic situation and they receive lots of training, the logs." (I6)

Preparedness is an area of messiness in HL that also ties into other aspects of the conceptual framework, as there is a particularly high stakeholder involvement and accurate data is imperative. Preparing kits to be deployed quickly during an emergency has gained currency within the HL community (I1, I7, I10).

"We try to build kits for different things that you can just grab off the shelf when they are needed, and they already include the documents and everything, so there is not that time of waiting around before you can go." (I7)

"We have kits in [the organisation's main warehouse], we can be quite quick in supplies to the field" (I10)

In order to achieve preparedness and to enable an organisation to build kits successfully, they need to achieve a good understanding of the potential demand that is likely to occur, a feat that is mainly based upon previous experience in the field, particularly in organisations or parts of organisations that specialise on particular aspects of humanitarian work such as a certain disaster type or a certain part of aid provision (I1). However, preparedness also relies upon continuous funding streams that are not related to specific missions, as the investments need to be completed in advance of the development of certain needs.

"NGOs do themselves a disservice by advertising things such as "97p out of every pound go to the field" – many even have a 10% cap on overhead costs. Try doing that in a commercial organization! That would be seen as a very bad investment, because

with that you can't have any good systems in place, you can't have any R&D, it's just not sustainable!" (I9)

Preparedness thus presents a key area in which different capabilities and levels of the organisation interact with external stakeholders in order to further the practice of HL.

Sourcing was a topic of great importance for the participants of the initial round of interviews, stating *"our biggest issue is the way of sourcing and the continuity"* (I12). Sourcing is part of a complex network of interactions with donors, beneficiaries and authorities around the world. There were advocates of both local sourcing (I2, I9, I12) and global imports (I11, I14). The latter highlighted that *"the sheer variety of items is immense and everything will come from different sources and present different challenges"* (I11). Furthermore, they extolled the virtues of having higher and more consistent quality standards in the global market, and also being able to negotiate better prices by utilising economies of scale (I11, I14). As the continuity of funding remains a concern (I11, I12, I14), such savings are fundamental to HL.

Local sourcing is chosen by organisations in order to make a positive impact on the local economic situation and to build capacities with local companies and is thus linked to the interests of the stakeholders, as well as the socio-economic impact (I2, I9). However, further complexity is added due to the previously discussed bureaucratic barriers and administrative deficiencies, as I12 explains *"it is a nightmare to get stuff through customs. There is so much corruption... we tend to source within country"*. Moreover, local sourcing can enable a more precise identification of local needs and the timely response to them (I2), in comparison to the long lead times that are almost inevitable within a global SC (I14).

Despite these advantages, there are situations in which even organisations that firmly believe in local sourcing will resort to importing materials if there are shortages or difficulties with suppliers within the country:

"We did have a situation in Tajikistan... the team there were working in a remote area and needed constant supplies of blankets and whatever, and we did ship from the States, we shipped container loads of blankets and tents and warm clothes... but that is very unusual." (I12)

Furthermore, while tangible items are sourced within country, expertise is often brought in from outside, as capabilities are not existent within the recipient locality or cannot be identified within a suitable timeframe (I2).

4.1.3 Non-Routine Operations

The aspect of *Non-Routine Operations* forms part of the Dynamic Complexity half of the conceptual framework for MSCs. To the casual observer, this aspect represents the most obvious source of messiness in HL as compared to its commercial equivalent. Key themes discussed by the interviewees are displayed in Table 14.

Table 14: Non-Routine Operations

Infrastructure	The general lack or destruction due to disasters complicates humanitarian operations
Project	Organisations are working within a project environment with relatively constrained timescales and mainly short-term targets
Flexibility	Is strongly needed in unpredictable and frequently unstable situations that form the operational environment of HL
Routine	Needs to be developed and standard procedure followed to increase the efficiency of HL
Learning	On an organisational level could lead to an improvement of HL over time

These five themes are presented in this section illustrated by representative quotes taken from the initial round of interviews, with individual informants referred to by their alphanumeric identification.

One of the key aspects discussed in the literature is the lack of suitable ***infrastructure*** as a major contributor to the non-routine nature of HL, the very fundamental *"physical problem of getting through to people"* (I2). As I9 highlights *"very often the routes are disrupted, the infrastructure is destroyed or was never there to begin with, so that is a problem"*. This is a particularly pertinent issue in the aftermath of natural disaster.

"You don't have the roads to use and the roads that are not flooded are often not suitable for our very heavy vehicles. Then you have to make other plans. We have boats of course, so that helps [...] but yes, getting stuff to where we need it is a problem" (I1)

Interviewees highlighted that even the best management tends to resort to improvisation when faced with such environmental challenges (I1, I2, I4, I11).

Several participants described the working environment as ***project*** based (I4, I5, I6, I9, I13). This was emphasised because of its implications for the longer-term

operations of humanitarian organisations, as interviewees felt they went *"from one project to the next and no continuity"* (I4) and that *"there is no routine work [...] it is all ad hoc, you just respond to what is happening around you"* (I11). The project management approach is predominantly attributed to the nature of humanitarian responses:

"The issues are always ad hoc, you cannot predict that accurately. So it looks like we are doing a lot of fire fighting." (I9)

Interviewees stressed that this leads to a management approach that lacks consistency and clear, achievable performance targets for individuals as well as HL, as a whole (I13). Furthermore, staff rotation can contribute to this mind-set as many staff members only stay with humanitarian organisations for a short period of time, either to finish one mission, or for a fixed term based on a volunteer commitment (I5, I6, I10). The focus is therefore predominantly on the current mission, rather than taking a more longer-term perspective. This has consequences not just for the success of individual humanitarian responses, but for the overall effectiveness and efficiency of HL:

"There's a stop-start thing to that and it's focused on project results, not necessarily focused on the long term improvement of the process." (I5)

Flexibility is regarded as essential in humanitarian responses (I2, I4, I6, I11, I13, I14). The situation on the ground constantly changes, as organisations tend to *"operate in unpredictable environments and sometimes we have to act very fast"* (I13). The environment is described as *"very hectic and unstable"* (I4). In an effort to respond to this and implement the requisite flexibility, organisations tend to give logisticians on the field level great responsibility to shorten response times to the ever-changing environment (I12, I14). Being self-motivated and able to prioritise multiple demands is important for logisticians able to operate efficiently in this environment (I9).

The high flexibility the environment demands can however be difficult to implement within the conditions and constraints of a humanitarian response, while the required approaches are in existence in commercial SCs, putting them into a humanitarian context can prove difficult or even impossible (I13):

"In that unpredictable mess we work in, we need really agile SCs, but there is no way to implement that." (I4)

This belief is tied to previously discussed bureaucratic hurdles and the long lead times, which in turn are linked to the infrastructural issues (I6). Furthermore, security concerns significantly hamper flexibility (I9).

Despite the ad hoc nature of HL, the previously mentioned project-based approach and the obligatory flexibility, respondents were adamant that their work was often **routine** (I6, I8, I9, I11). They insisted that *"while there are many different issues, there are always the same underlying principles, so it is routine in a way"* (I9) and readily provided examples such as supplying teams dealing with malnutrition which follows the same process around the world (I6) and aspects of procurement which are described as *"a bit of a laborious semi-government process where you have to prove and document"* (I8). As these parts of HL are seen as standard and routine, there is no need to *"reinvent the wheel all the time"* (I6) and respondents advocate standardisation in HL:

"It's just a process, following the process and if you can't follow the process, document why you can't follow the process. It's all straightforward to be honest, it's not that complicated, it's just, again, just getting into a routine of 'I'm allowed to do this; technically not allowed to do that; if I do that I have to say why I'm doing it.' " (I8)

Nevertheless, there are also those who criticise the desire to standardise and implement rigid processes — *"sure it sounds like the easiest way to do things, but in practice it doesn't hold"* (I5). Even if the environment resists standardisation, the demand for HL is constant and faces many of the same challenges no matter the context:

"There is not much you can do to change the environment. There will always be a disaster and the infrastructure will be bad." (I11)

Each humanitarian response can present an opportunity for ***learning*** and thus for an improved operation in time for the next response (I1). Interviewees acknowledge that much learning takes place in the field (I5, I6, I8, I13) However, as staff turnover is high and many logisticians are only assigned to a particular mission for a limited time, valuable experience is often lost quickly, and responsibility for passing on essential information rests with local staff who tend to remain in post for longer (I10). Humanitarian organisations are very aware of the importance of managing existing knowledge, but participants remain critical of the actual capabilities:

"It's discussed very much in our sector and there are a lot of people involved in it. It still begs the question if we are any good at it, that's something else." (I5)

Learning often hinges on individuals, and best practice tends to occur because it is a personal concern for a particular logistician (I6, I13). Staff training is seen as essential:

"There are the manuals as well, so there is stuff written down, but the really important stuff is in your brain. You have to learn. It's not much point learning from manuals. In the end you have to know and you have to react. That takes time." (I1)

Learning does not have to be limited to individual projects, but *"learning will also be based on what you do centrally"* (I13), especially as technology is used to create databases of previous experience. However, the inconsistency of funding means that options to effectively invest in longer-term data gathering and knowledge management are limited (I4).

4.1.4 No Clear and Quantifiable Specifications

The aspect of No Clear and Quantifiable Specifications represents the second part of the Dynamic Complexity half of the conceptual framework for MSCs. It relates to the difficulty of accurately comprehending and documenting messy or wicked problems. Comments from the participants fell into the following main categories as listed in Table 15.

Table 15: No Clear and Quantifiable Specifications

Needs Assessment	Is essential immediately prior to a humanitarian response or in the early stages of one, thus determining the design of the SC
Local Level	Data gathering as required for the development of efficient and effective SCs is challenging
Forecasting	Demand within a humanitarian response with sufficient accuracy to enable logistics planning is difficult
Data needs and availability	Differ between hierarchical and organisational levels within a humanitarian organisation
Technology	Use facilitates data gathering and information management to plan, execute, and develop HL

This section of the chapter provides further explanation of these five key themes and illustrates them with indicative quotes from the initial round of interviews to showcase their contribution to the characteristics of MSCs.

Needs assessment is essential in the early stages of a humanitarian response in order to understand the situation on the ground and enable organisations to respond accordingly by setting up suitable SCs (I1, I2, I5, I10). It is usually the responsibility of

humanitarian logisticians to *"make sure we have the right material for our crews to keep working and that we do what we can for the people who are affected by whatever emergency we respond to"* (I1). To enable organisations to respond in a timely manner, especially in the case of emergency responses, needs assessment is often based on prior experience, which in many cases hinges upon the work and memory of individuals (I1, I2, I5, I10). Given the immediacy of the response, time for needs assessment might be virtually non-existent:

"In Emergencies, we are very, very, very rough. I can give you an example. Philippines, typhoon, I was actually at that moment sitting at the office. We heard the news, and I looked at the mobility profile of the regions, talked to some people, start thinking what is going on, what country, what can we see there? What do I think are our needs? I thought ok, probably primary health care. Oh there are actually some people with HIV. Send all the kits on the plane and send. So very, very fast. You just, think we can get this many people, we'll probably need this, and you just go. In Syria when we opened the mission, you just make a raw estimation on the population that you expect to receive in your clinic or whatever you are going to do, and you look at the mobility profile and you make your order." (I10)

However, good needs assessment does not stop after the initial phase of a humanitarian response (I5). The challenges continue, as data gathering on the ***local level*** often proves difficult in the constantly changing environment of a humanitarian response as the following vignette illustrates:

"When we start that programme we honestly don't know if there are 100 wells, 82 or 137 [...] so we don't really know what amount of material we need. We know what type of material we need, and we know we need some tools and so what we can do is then set up enough materials to keep us going for three months and then while we're doing that we're actually surveying [...] and then as we progress maybe after the first three months we can then make another supply line for six months and then another supply line to the end of the project." (I5)

Because of the complexity and interdependency of the situation on the ground, organisations struggle to accurately assess their environment in a timely manner (I1, I2, I5). Local staff can provide invaluable information (I8, I9). However, data collection facilities and knowledge about information management within the local area is often limited and the available historic data is rarely accessible (I14). The availability of local data is crucial for the operation of a SC: *"Our job is to get the right goods to the right places at the right time, but we need the local information to know what is right."* (I3).

Social media has been very beneficial to gathering information about the local situation, even in areas that are immediately affected by disasters (I7).

Forecasting is an important SC activity, but faces similar problems to needs assessment as data availability is chronically poor (I5, I10, I11, I13, I14). Visibility in the SC is often low, leading to little understanding of the structures and processes (I7), which in turn makes it difficult to establish the contribution of HL *"vis a vis databases, facts and figures and data; so it's quantitative information [that we lack]"* (I5). However, forecasting is not necessarily a challenge in all responses *"in certain contexts it's relatively easy. If you look at our HIV project in Myanmar I think we've signed up something like 27,000 people. You know with that type of number and in which states of the disease most of them are and you can quite fairly predict for the next six to twelve months how many pills they are going to need"* (I13). Nevertheless, the same interviewee admits *"in a context like Syria or South Sudan right now it's extremely cumbersome"* (I13), highlighting the difference between forecasting in an emergency response and in a developmental programme. Mainly, forecasting depends on previous experience of individuals (I5), but this can be challenging as there is little consistency in staffing or operations (I9). Historic data is often scarcely available or inconsistent (I13). Furthermore, interviewees questioned the validity of historic data given the non-routine nature of humanitarian responses (I1, I11, I14). This situation results in *"a lack of information, of planning information"* (I14), but there is an awareness of this issue and efforts are being made to improve forecasts (I10, I13, I14).

Data needs and availability vary according to the hierarchical level and organisational aspect within humanitarian organisations. Where historic data is collected, this is often done in a centralised database, which facilitates access and learning across humanitarian responses, but might have detrimental effects on the level of detail and local information available (I13). Communication between headquarters and the field level is a source of frustration as each has access to different information and places value on different aspects of the available data, with headquarters often prioritising efficiency, while the field level operatives are primarily concerned with the constantly changing demand (I1, I5, I10, I14)

"The high up people don't know! We know but we can't plan. It's shit, I tell you!" (I1)

As training for humanitarian logisticians improves, there is a growing awareness of the need to look beyond the immediate environment and to take into account broader information (I14). Ultimately, a combination of both centralised databases and detailed

local knowledge is required for improved HL (I9). However, rapidly changing situations without suitable precedent are difficult to capture centrally, and depend primarily on up-to-date local information (I14)

The use of ***technology*** can be both beneficial and challenging in gathering and using data. Given the scarcity of quantitative information that is currently available in the HL context, implementing databases of historic and current information on supplies and suppliers, as well as demand patterns, is seen as a promising step forward (I5, I14). Compared to commercial organisations, information systems are rudimental: *"don't expect too much, there is no SAP system or anything like that. It's very basic if you compare it to proper supply chains"* (I4). However, in organisations that have implemented information systems, interviewees are full of praise for the quick response and accuracy:

"You know, it's a good system. Even when unexpected things happen. Boom, you have a cholera outbreak, but they are so good at what they do, they can just press a button and wallah, there you have it, everything you need for 10,000 people. It's all in the system really, that's why they are so good!" (I6)

Technology has also been used to improve the visibility of information in the SC, thus leading to more informed decision-making within HL (I5). Limited IT skills among staff particularly at field level and within the local population constrain the potential benefits of technology implementation (I4, I5).

4.1.5 Multitude of Diverse Stakeholder Views

As the first part of the *Behavioural Complexity* half of the conceptual framework, the Multitude of Diverse Stakeholder Views aspect is discussed here. Behavioural Complexity deals with the social properties of wicked and messy problems, the ones that directly stem from human interactions within the problem situations. These properties were highly evident in the initial interviews and are summarised according to the main themes displayed in Table 16.

This section further expands upon each of these themes that present important parts of behavioural complexity as a part of the MSC framework. The themes are illustrated with indicative quotes from the primary research.

Table 16: Multitude of Diverse Stakeholder Views

Donors	Have a significant influence on the basic ability of humanitarian organisations to operate, as well as shaping their priorities and accountability
Beneficiaries	Are important stakeholders, but planning and consulting interactions with them are often limited
Military	Interactions are inevitable in many humanitarian responses and potentially very useful, but also fraught with difficulties
Cultural differences	Are one particularly prominent feature in the interactions with stakeholders
Local community	Is inevitably involved in humanitarian responses, but while local knowledge is highly valued, organisations struggle with these interactions

Donors were at the forefront of each interviewee's mind when questioned about stakeholders. Essentially, they provide the funding that each humanitarian organisation needs to operate, whether they are small private donors, governments, or multinational organisations (I4, I5, I8, I9, I12, I14):

"The basic problem is that in industry you can do whatever you want... here we are tied to donors. Before you get funding you cannot do anything. So our biggest challenge is to align funding and demand." (I4)

Furthermore, donors give guidelines for an organisation's spending and demand accountability (I9). Earmarked funding that is tied to a particular humanitarian response is particularly difficult to deal with (I12). The continuity of funding is highlighted as a major problem, while acknowledging that accountability is important, respondents also pointed out that donor demands are not always reasonable and that they often struggle to provide the demanded information without jeopardising the success of a humanitarian response (I5, I8, I9). It is noted that donor interest rises and falls quickly and that there is little interest in investment in infrastructure or development to enable organisations to build more efficient SCs (I4, I5).

Funding comes with different stakeholder views and values, with interviewees noting that governmental funding in particular is "*very, very political, it's difficult to handle sometimes"* highlighting the long and cumbersome approval processes (I4). Furthermore, economic downturns have resulted in a significant decrease in the amount

of governmental funding, making organisations rely more strongly on private donors, whose regular, small donations have proven to be less volatile and a more consistent source of income (I12). However, private donors also require more education, particularly on the uncertainties in humanitarian SCs and the need for continuous funding (I5, I9).

Beneficiaries notably form a less substantial part of the narrative in the initial interviews. However, it is necessary to mention that some respondents *"do not always work with the people directly; we often interact with the national health system"* (I4) or other intermediaries. Interactions with beneficiaries will depend on the peculiarities of the mission. Sometimes humanitarian organisations work with minimal information from local sources, especially in emergency responses when a quick response is cited as being more important than interactions with beneficiaries and local authorities (I1), while others cite security concerns as the reason for limited contact with anybody beyond immediate beneficiaries (for example patients in a medical mission) (I11). However, there can be significant impulses from beneficiaries, particularly in developmental humanitarian responses, as illustrated by the following example:

"We were in India for forty years before this group came and said to us and to other Christian organizations would you help us in our struggle for freedom. When we said what do you want us to do, they came and said we want you to educate our children. We were not an organization that had experience in that area. We had to change direction and train teachers. We now have a college with very highly trained staff. Instead of training church leaders and pastors we are now going to train teachers. We have to change our approaches." (I12)

In many humanitarian responses, interactions with ***military*** forces, international and national armies, as well as local militias of various descriptions are almost unavoidable. While some organisations recognise the experience the military has in responding to emergencies and in expeditionary logistics in particular (I14, I8), and others even strive to emulate military structures in attempts to increase efficiency of their own responses (I1), some respondents stressed the key differences in motivation and the importance of upholding the humanitarian standards and ideals (I6, I10, I13). Depending on the situation on the ground, a very important stakeholder group can be *"the international military who now take claim on aid... it's all become very political, they go in and say, for example, if you do this and you tell us where the Taliban are, then we let aid in"* (I6). The example illustrates the gatekeeper function that can be vital to humanitarian aid and limits the organisations in enacting humanitarian

principles. The same can be said for other armed forces, which control access to certain areas:

"We have a proposal to distribute food parcels to families in Anbar Region which is just west of Baghdad and slightly not controlled by the Iraqi Army. On the wrong side of being controlled by the Iraqi Army so it's an ISIL controlled area and [...] we still haven't heard back. So, if you ask me, that's it." (I8)

Despite this conflict of ideologies, some respondents acknowledge *"that there is just some obvious synergies between the military, the NGO"* (I8), and strive to cooperate with them as far as possible (I2, I4, I14).

Cultural differences and the importance of intercultural competencies among humanitarian personnel featured in several interviews (I2, I4, I5, I6, I13). Some organisations see the increased recruitment of staff from areas that are traditionally beneficiaries of humanitarian aid as essential, *"working hard to de-westernise themselves"* (I6). To achieve efficient and effective humanitarian SCs, *"a very thorough understanding of the local culture and customs is so important"* (I2), and workers *"need to be able to relate very much to all the different cultures and all the —let's say— slowing down, inconvenience or misunderstandings that may come from that sometimes"* (I13). This directly affects a variety of HL activities that need to be adapted to the particular cultural context of each humanitarian response:

"For example, while dealing with purchasing activities, you will not use the same negotiation methods in Somalia as you would use in Singapore, you have to adapt to the audience… respect of the elders, respect of protocols, respect of religious comportments, genders sensitiveness…" (I4)

In managing and responding to cultural differences, it is seen as vital to change procedures as needed and to accept different ways of thinking to maximise the impact of the aid delivered.

"The linear approach to planning is really a Western model. In these cultures, it is much more about collaborating and developing something together" (I2)

Interactions with the ***local community*** occur in any humanitarian response, but the degree to which organisations engage and rely on local knowledge varies, as there are significant time and often costs involved in engaging locals, even though organisations are aware of their contribution to resilience and security (I9). Those who do better with this are highly critical of organisations with a more short-term, project-based mentality:

"If you take an example like what has happened in the Philippines… so many organizations are there when it happens and when it's in the media and there's lots of funding coming in. They are there. And when they are there they move in. We saw that horrifically in Afghanistan. When they are in the country, they are renting the best properties, they have all the 4x4s and so on. Where our teams are involved, that's a team that lives in that country, is based in that country. They are still there in a disaster situation and they work and provide that continuity." (I12)

"The country director who was here, when it all kicked off in June and ISIS decided to go on a tour of Iraq he said to me, he just looked, I'll never forget, he said "the circus is on the way." I said "what do you mean?" He said "the minute this happens…" he's been around the block this guy, he said "the minute this happens you get an influx of NGO people and you'll spend half your time explaining to them the context of where we're working and if we got the money we'd do the job quicker. We're going to spend half our time just explaining to people what it is we're doing" (I8)

The most important local stakeholders are usually governmental and administrative bodies (I4, I5, I12, I14), although staff on the ground often have very limited interactions with them as these activities are coordinated centrally (I6). The interaction varies depending on the scale of the response:

"You know, a relatively local disaster, you will be interacting with a mayor or a leader of a small community. On the other hand, there are large disasters when it's all on an international scale, so the size of a disaster really makes a difference for who is involved." (I7)

Local stakeholders are not necessarily in favour of humanitarian organisations moving in and disrupting the market:

"In Syria, we were private providers [...] local pharmacies were not in many ways happy with us. Of course that comes with a changing structure and economic situation in Syria, where people have no means to pay out of pocket, so somehow, yeah, it is already destabilised [before we move in]" (I10)

4.1.6 Sociopolitical Impact

Sociopolitical Impact forms the final aspect of MSCs according to the previously developed conceptual framework. It also falls within the realm of Behavioural Complexity and is therefore particularly closely linked to the *Multitude of Diverse Stakeholder Views* aspect introduced above. It featured prominently in the initial round of interviews. Main themes discussed are summarised in Table 17.

Table 17: Sociopolitical Impact

Governmental donations	Present a major part of the funding of many humanitarian organisations, tying them to politics
Neutrality	Can be difficult to uphold as a core humanitarian principle amidst the realities of humanitarian responses
Society	Humanitarian responses often face distrust or criticism from society at large in the area or even the nation they occur in
Politics	Within the area or the nation can influence, as well as be influenced by humanitarian responses

All of these themes concern the operational environment of SCs in the humanitarian context, essential for understanding the interactions between SC and wider forces, as explained in the CAS literature.

Attitudes to ***governmental donations*** vary widely among respondents, ranging from organisations that are funded almost exclusively by one or more governments and often operate under their mandate (I1, I4, I8, I14), to those who actively decline any attachment to governmental funding (I6, I7, I10, I11, I13). Among the former there is a keen awareness of their status being tied to the political climate and priorities of the government. Continuing to receive funding from changing administrations is seen as a badge of honour:

"In the end it's a government organisation. We get our money from the German government; if they don't want us any more, we are fucked. But they want us, they all want us, every party, every government. Shows you we are good, eh?" (I1)

Further to the constant fluctuation of political agendas, governmental donations are seen as particularly volatile, in relation to worsening economic conditions, as humanitarian spending is often among the first budgets to be cut (I3). One interviewee stated in relation to terminated humanitarian projects in his organisation:

"A lot of the reason for that was because of the downturn, there was no money. So the government couldn't fund it." (I8)

For the organisations that do not rely on government funding, this is often a matter of great pride as independence from such sources of support is seen as a true representation of humanitarian principles of neutrality and impartiality (I6, I10, I13). Furthermore, organisations enjoy more freedom in their operations without a reliance on governmental donations and the performance controls attached to these:

"We don't get any funding from political parties or from the government or anything. We relish the fact that we are independent from government funding! You get painted into a corner if you do that. (I3)

Neutrality is a core humanitarian value that encompasses the lack of any differentiation between beneficiaries, so none shall be excluded from receiving required aid based on race, religion, politics etc. Attitudes towards neutrality varied widely among respondents. While some regarded it as the guiding principle of their work and raison d'être (I6, I7, I10, I11, I13), others were more critical (I1, I4, I8, I14), However, participants from both of these camps acknowledged that their work is highly political, whether or not they fully subscribe to the principle of neutrality. They regard politics as the root cause of many of the scenarios that elicit a humanitarian response and thus find it difficult to separate politics from their work (I9). Instead of lessening the involvement in politics, adherence to the principle of neutrality can indeed cause further complications in the work of humanitarian organisations:

"It is somewhat ironic that because of the neutrality there are a lot of political aspects to our work. We have to tread carefully. Generally, we go where we are needed with no regard for politics, but then of course once we are there, it is difficult not to get caught up in it." (I11)

On the other hand, not remaining neutral has also resulted in difficulties for organisations, resulting in some being forcibly removed from countries where they were running humanitarian responses (I4). Particularly in sensitive political contexts, maintaining neutrality on the ground can be essential for the continuity of humanitarian work, but responses in such contexts are also much more likely to be politically motivated in the first place with donors having an input into what can be done and how operations are conducted (I2).

Several interviewees pointed out that ***society*** in the host region is not necessarily enamoured with their presence, at least initially (I3, I4, I8, I11, I12). Particularly in areas that have seen much humanitarian aid over the years, there is an awareness of the quality differences and a wariness of the intentions of the incoming organisations (I3, I12).

"You've got to prove to them and to be honest with you, I understand where they're coming from, you've got to prove [...] we're not fly-by-nights, we're not going to come and go. You know, you've got to prove yourself and I get that." (I8)

In some instances, foreigners are viewed critically because of their lack of cultural understanding (I2, I6), but particularly in highly political scenarios, or in humanitarian

responses due to man-made disasters, there is also a hesitancy to let foreigners observe and potentially report on the happenings on the ground:

"It is often the case that they do not want foreigners to be there because they do not want witnesses to what's happening." (I11)

Although the organisations do act as witnesses, they also acknowledge that their position can be vulnerable thus making it *"very difficult to do advocacy there. You know we have to be very polite and careful, even if we don't agree"* (I4). If an organisation is seen to be overstepping their mark, their ability to fulfil their humanitarian mission can be hampered significantly and in some cases, organisations have been forced to withdraw from countries for their perceived meddling in sociopolitical affairs (I4, I8). Advocacy can therefore be negative for the overall humanitarian response:

"In Sri Lanka for example, we knew that cluster bombs were in use and it was terrible and everybody condemns that, but we also knew we had to stay silent if we wanted to stay in the country and actually help people" (I11)

Humanitarian responses are both influenced by ***politics*** in the local area or the host nation and have an impact on them, an issue that was mentioned by many respondents (I2, I4, I5, I8, I11, I13, I14). Recently, respondents have observed that *there seems to be a definite trend for the country to assert their independence and the power of their government by making import more difficult"* (I5). While autonomy of developing nations is generally seen as desirable, humanitarian organisations have found that this trend leads to higher bureaucracy in all parts of the SC that interact or depend on local political structures (I2, I13, I14). Bureaucracy is exacerbated when handling sensitive products such as drugs that are regulated on a national, as well as an international level (I4). This is regarded as an area that required urgent improvement, but respondents acknowledged that it is outside of their sphere of influence:

"What would be good is if the government blocks would be removed. They mess you around so much, but any improvement has to come from the developing world itself." (I11)

The highest level of influence is accredited to the local level of politics, which necessitates extensive stakeholder interactions (I4, I5, I12, I13). Matters of access to target populations, as well as security concerns are often negotiated at this level:

"It's like the local politics, say, north of Mosul. If you don't officially say hello to the right person and just say hello and who you are, they could get their nose out of

joint and they usually do. Where, on the other side of the coin when you do say it to them, they probably give you nothing anyway!" (I8)

The political nature of HL is also evident within organisations as several interviewees stressed in reference to the nature of HL which they described as being inherently adverse to change because of wider political agendas and a lack of market forces, stating that *"you take zero risk… if you do nothing, you stay in your position*" (I14). Overall, respondents agreed that they are working in a highly political context:

"You have to realise that with all the humanitarian work, it's not just about doing some good, it's about politics most of the time." (I2)

4.1.7 Summary of Initial Interviews

Section 1 of this chapter has provided a summary of the findings obtained from the 14 interviews of the initial round of the data collection in this study. Extracts of the data were included in this section to illustrate particularly important aspects of the discussion in which the respondents engaged (Wolcott 2001). Evidence of all five characteristics of MSCs according to the proposed conceptual framework was found within the data gathered through the initial round of interviews. This contributes to addressing Research Objective 3 by exploring the proposed conceptual framework in the context of HL. Figure 25 summarises the key themes identified.

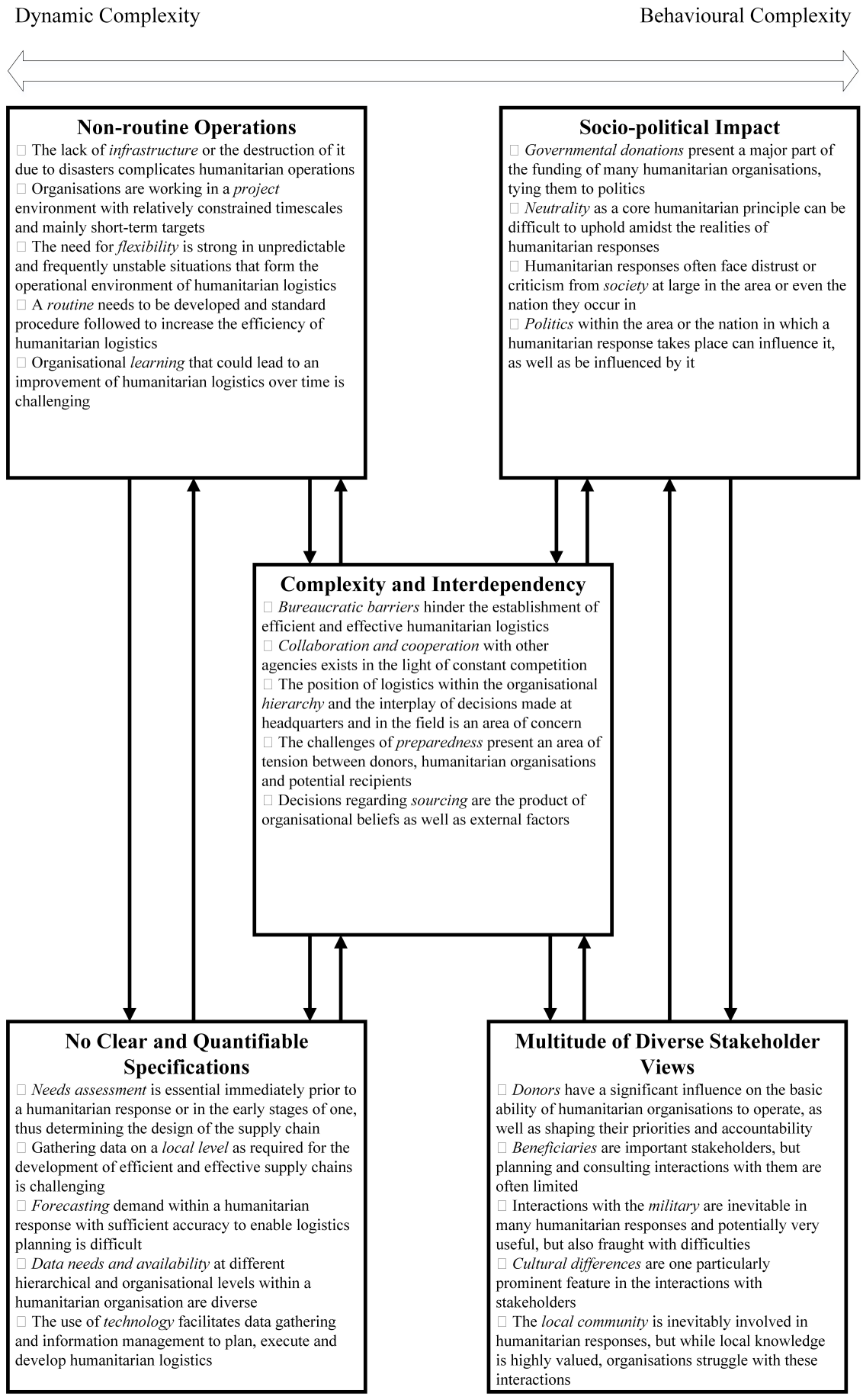


Figure 25: Summary of Key Themes Identified in the Initial Interviews (author's own figure)

4.2 Emergency Response to the January 2010 Earthquake in Haiti

Through a casing approach, three case studies were developed based on recommendations from the initial round of interviews highlighting particularly interesting cases (Ragin and Becker 1992, Spring and Santos 2015). Humanitarian responses emerged as the most suitable unit of analysis to capture humanitarian SCs for this study. Respondents highlighted the distinct differences between emergency responses and developmental missions. The emergency response to the January 2010 earthquake in Haiti was seen to be particularly pertinent due to the high media attention and extensive global aid, as well as the significant problems with HL and the operations in general.

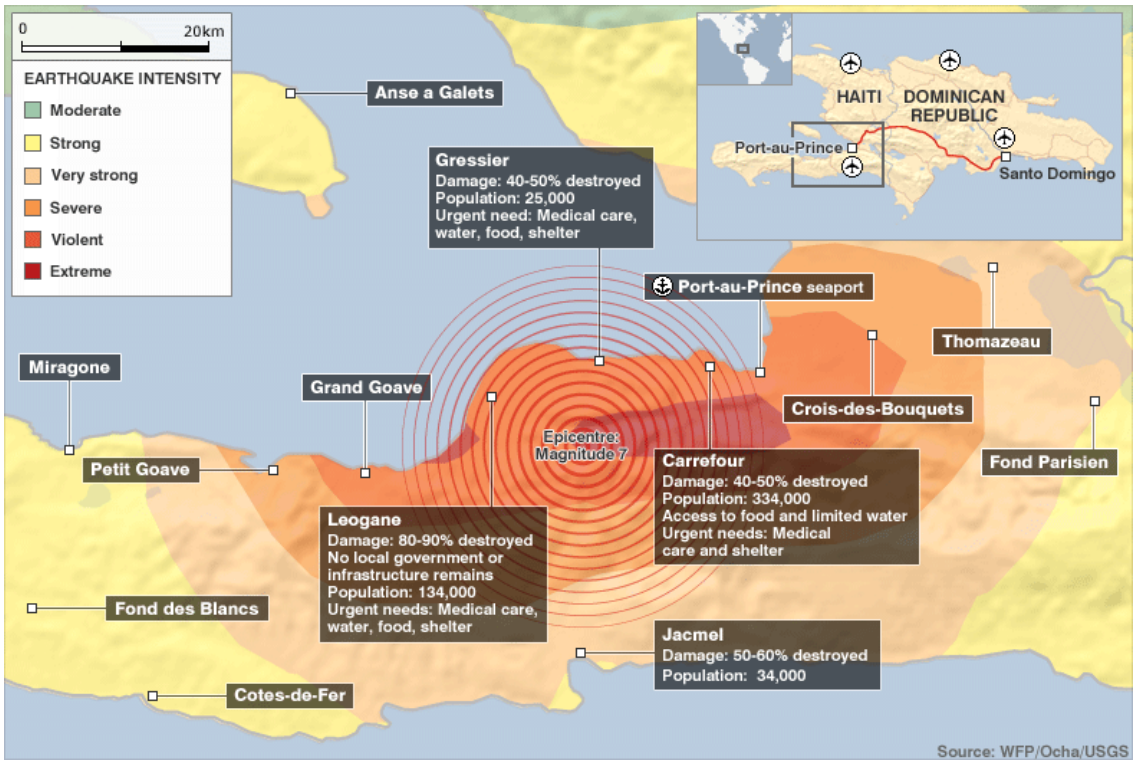


Figure 26: Map of earthquake intensity, Haiti, 12th of January 2010 ('Haiti Earthquake Maps' 2010)

On the 12th of January 2010, the largest earthquake ever recorded in the country devastated the Haitian capital Port-au-Prince and surrounding areas; the initial shock had a magnitude of 7.0 with series of strong aftershocks further adding to the destruction (Margesson and Taft-Morales 2010). Figure 26 shows a map of the earthquake intensity and provides examples of the extent of the damage. The Em-Dat database lists the number of total deaths as 222,570 with 3,700,000 people affected and total economic damage of US$ 30 billion, thus making it the largest natural disaster of the year 2010 ('Disaster Profiles' 2015). The humanitarian response to the disaster was immediate and significant. By December 2012, US$ 6.373 billion had been pledged by

nations and international institutions (EC, IMF, Word Bank etc.) of which 56% had been disbursed (*New York conference recovery pledge status and modalities as of December 2012 in USD millions* 2013). Haiti was already the recipient of extensive developmental humanitarian assistance from the international community prior to the earthquake, but was set back in its development significantly by the extensive destruction of its nascent infrastructure (Margesson and Taft-Morales 2010). The country has a long history of political unrest since its independence in 1804 and is currently considered the poorest country in the Western Hemisphere with a population of about 10 million 33% of whom are less than 15 years old ('The World Factbook' 2015).

4.2.1 Introduction

Ten interviews were conducted as part of the Emergency Response to the January 2010 Earthquake in Haiti case study (for the sake of simplicity called Haiti case study from hereon). These interviews were conducted with individuals from ten different humanitarian organisations, including five small and five large organisations. Six of them self-identified as logisticians, with the remaining four having a close relationship with the logisticians within their organization, for example administrative roles authorising and processing orders. Table 18 summarises personal and organisational information for all participants in the Haiti case study.

Table 18: Participant Characteristics in Haiti case study

	Organisation Size	**Gender**	**Position**	**Job Description**
H1	Small	Female	Headquarters	Other
H2	Small	Female	Headquarters	Other
H3	Large	Male	Headquarters	Logistician
H4	Small	Male	Field	Logistician
H5	Large	Male	Field	Logistician
H6	Small	Female	Field	Other
H7	Large	Male	Headquarters	Logistician
H8	Large	Male	Headquarters	Logistician
H9	Small	Male	Field	Other
H10	Large	Male	Field	Logistician
SUMMARY	*5 small* *5 large*	*3 female* *7 male*	*5 headquarters* *5 field*	*6 logisticians* *4 other*

To protect their anonymity, informants are only identified by an alphanumerical code, where "H" stands for participation in the Haiti case study and a number is assigned at random to each interview. Numbers have not been assigned according to the order in which the interviews were conducted, nor according to any characteristic of the interviewees.

All informants were involved in the humanitarian response to the previously described natural disaster. None of the respondents had been working in Haiti before the earthquake themselves, but several organisations had a prior presence in the country, with some suffering significant damage to their own infrastructure and loss of life among their staff. At the time of the interviews, five respondents were still involved in humanitarian work in Haiti while the others had moved on to various other missions.

4.2.2 Complexity and Interdependency

There was considerable evidence of aspects of Complexity and Interdependency in the Haiti case study, the aspect of the conceptual framework that combines both *Dynamic Complexity* and *Behavioural Complexity,* an essential component of CAS, wicked, and messy problems. Areas of particular importance highlighted by the interviewees in regards to logistics in this humanitarian response are displayed in Table 19.

Table 19: Complexity and Interdependency

Competition for donations	Occurred in this humanitarian response due to the scale of the international interest
Duplication of efforts	Posed a problem because of the large number of organisations in a fairly small disaster area
Cooperation	With both non-profit and commercial organisations was identified as a solution, but also as a further source of complexity
Local sourcing	Was severely constrained in Haiti, but seen as desirable by respondents to support the local economy
Strategic direction	Was required from humanitarian organisations in Haiti even though it was an emergency response

These five themes are discussed in detail in this section incorporating quotes from individual interviews as illustrations of particularly pertinent issues that relate to this aspect of the conceptual framework of MSC.

Respondents highlighted the intense ***competition for donations*** in this particular emergency response, which did not lack attention in the global media, nor in funding, but had organisations scramble to try and receive a sufficiently large part of the overall monetary flow (H1, H2, H6, H7, H8). In fact, the high level of awareness and attention is actually seen as a hindrance, particularly to sustainability and efficiency:

"Unfortunately, you have to say that it is quite a big competition [...] the real problem is that people do not want those efficiencies. The brand of an organization has to be seen first, particularly in sexy disasters. Every organisation wants to be seen as leading the way." (H6)

This status of Haiti as an attractive disaster that organisations want to be seen to have a presence at is reiterated in several other interviews (H1, H2, H9) and was also a characteristic that respondents in the initial round of interviews has noted as being peculiar about this humanitarian response, deeming it worthy of further study. The very high visibility of the disaster for donors made the response a matter of prestige for organisations, both established ones and newcomers to the humanitarian industry (H7). There is a concern that the focus of some organisations was more on satisfying the demands of philanthropists in their home nations, rather than trying to create a meaningful humanitarian response for the people affected by the earthquake, a particularly pertinent issue with very small, often newly developed organisations without prior experience (H1).

Due to the large influx of humanitarian organisations, the problem of a ***duplication of efforts*** developed in the geographically small area affected by the earthquake, especially within the capital Port-au-Prince that was the focal point of the majority of the international aid shipments (H2, H3, H7, H10). Again, particular criticism is aimed at the smaller, newly developed organisations, as the more established agencies—according to interviewees working with them—regard them as lacking the necessary expertise and networks (H7. H8). However, established organisations were also critical of the initiatives to bring some organisation and coordination to the aid efforts:

"I know this is not very popular, but we need to pool resources across agencies to achieve cost savings. There is no point in duplicating efforts. There has been the Log Cluster... we have only been involved in that in Haiti and it was absolutely derided

there. It doesn't organise anything, it's just another way for people to feel important about themselves." (H6)

Generally, there is very little patience with the plentiful newcomers, as *"we know what we are doing and we are not here to waste our time teaching some little goody two shoes"* (H7). The larger, long-standing organisations have developed their own areas of expertise and often have extensive local or regional networks that enable them to provide more focussed aid (H8). The importance of local connections is lauded in determining the actual needs of the beneficiaries, and helping organisations establish their respective priorities in the highly competitive market for donations (H2).

Cooperation with both non-profit and commercial organisations was identified as a solution, but also further source of complexity (H2, H4, H9). Respondents see opportunities for improvement across their operations *"if we harmonised supply chains across not just organisations, but companies as well"* (H9). As detailed above, working together with other humanitarian organisations can pose further risks and complexities, as there are competing agendas and widely varying levels of expertise (H6, H7, H8). Especially beyond the immediate emergency response, interviewees identified cooperation with existing local initiatives as essential for successful humanitarian SCs, often seeking Haitian implementing partners (H2), highlighting that *"we are very careful that we do not harm local providers and that we make our work sustainable over time"* (H4) and the importance of *"giving business to the local community instead of farming it out to somebody else"* (H5). However, while it is freely acknowledged that working with local partners is helpful and particularly valuable in asset intense parts of the SC such as ground transport, there is also a concern for the quality and a growing awareness of the lack of control over aspects of the SC when they are conducted outside of the organisation (H9).

In the interest of local cooperation, organisations also highlighted their efforts to conduct ***local sourcing*** of both goods and services. There are advantages of economies of scale, as well as the development of long term relationships that guarantee reliable supplies with acceptable quality, when organisations rely mainly on a small amount of global suppliers (H2, H10), potentially even making sourcing *"the easiest part, because we are working globally, we are procuring with 10-20 different suppliers"* (H10) for demand that is consistent across different humanitarian responses. In addition, there are concerns about the availability of even basic supplies within Haiti.

"In somewhere like Haiti locally there isn't enough food that you could buy locally, again with consistency, quality throughout the year so we could probably do the

odd pilot, I think probably we will do some piloting on local purchases but it's likely for the foreseeable future we might look at getting better at purchasing and importing ourselves" (H2).

"We tried to source within the country first, but had to acknowledge that there just wasn't the supply there and we then looked at Dom Rep to see what we could get there, and only then moved in goods from the USA. That can make sense because there are less restrictions on local goods." (H6).

In addition to easier bureaucratic processes, there is also the benefit for the local market, which is a particular concern in a country like Haiti:

"Global procurement contracts [are] fine and they do great rates but they are basically shipping in everything so there is no added value to the community." (H5)

This longer-term perspective and the need for an overall ***strategic directive*** is a common concern among respondents in this case study, as there is a great awareness of the desperate commercial, as well as social situation in Haiti, particularly as many organisations already had a presence within the country for developmental missions before the earthquake struck (H1, H2, H7, H8). The SC in particular is seen as an opportunity to develop better business practices and heighten expectations:

"Often in international development and international aid we really think about the lowest common denominator, what's the cheapest we could do, how can we just get this done and I don't think we would accept the same in the UK, the US or any country. I think our expectations are so much higher and so really setting our standards exactly the same as we would want them here in the US or there in the UK in places like Haiti will have a huge impact." (H9)

While timely emergency response was important, respondents described a quick transition into setting up projects that were developed to have a sustainable impact on the local economy (H4) and highlighted that they had to balance immediate response *"with support of local agriculture and economies as well, because potentially the amount of food we could buy could be a really big support to the local agricultural and economic system"* (H2). However, local sourcing alone does not necessarily equate to support for the local economy, as there are further complexities in these SCs:

"There are drug manufacturers existing in Haiti right now and when possible we like to purchase locally but what ends up happening is the companies that are selling locally are international companies anyway and, basically, you're paying to have them ship in the drugs for you and it's just cheaper for us to do that; because we have limited funds we want to maximise our ability to purchase those supplies." (H9)

4.2.3 Non-Routine Operations

Non-Routine Operations are part of the Dynamic Complexity half of the conceptual framework for MSCs. Key themes discussed by the interviewees are presented in Table 20.

Table 20: Non-Routine Operations

Infrastructure	Was lacking or destroyed due to the earthquake, thus complicating humanitarian operations
Societal Structures	Were destroyed or absent, thus further hindering humanitarian operations, with interactions with the remaining governmental structures posing a specific challenge
Uncertainty	Was severe, posting a particularly significant complicating factor that inhibited the development of routines
Supply Chain Management	Had a poor image, which inhibited learning and development

The lack of ***infrastructure*** was a major problem for humanitarian organisations in the aftermath of the earthquake (H6, H7, H8, H9). The main issue was access routes such as the seaport and the airport:

"You have limited infrastructure in Haiti infrastructure in Haiti to support supply chain and infrastructure from the size and scale of the seaport, for instance, which was largely destroyed during the earthquake. We weren't sending containers through that port for months after" (H9)

"You've got a single runway airport that can only accommodate certain numbers of planes a day" (H7)

Respondents recounted their difficulties in physically getting goods, as well as personnel, into the country to an extent that astonished even experienced logisticians (H7, H8). Once goods had entered Haiti, the situation did not improve at all, as the national transport infrastructure had been annihilated or had never existed to begin with (H6).

"The capital city is densely populated with few roads. The road infrastructure was built when the population of that city was one-tenth the size it is today. So, moving

trucks and supply through the city, there is traffic everywhere so those are extreme challenges." (H9)

Furthermore, the lack of storage space and warehousing capacity was highlighted, particularly at the airport, which quickly became congested with incoming shipments that could not be moved onwards (H3, H8, H10).

In addition the destruction of physical infrastructure, ***societal structures*** had also collapsed in many places, leading to a perceived further complication of an already complex environment for HL (H2, H3, H7, H8). The death or disappearance of many leading figures in administration, government, and existing humanitarian missions was seen as particularly cumbersome for the establishment of emergency relief SCs, *"a problem because you just can't get through to where you need to be"* (H6). Many organizations with pre-existing developmental missions in Haiti faced the complete destruction of their established structures and lost their personnel (H7, H8), with very few still able to rekindle ways of assessing needs and interacting with the population (H1). The constant change in personnel on the ground due to the significant influx of aid organizations, combined with the upheaval in Haitian society resulted in a SC environment that was characterized by a lack of visibility and knowledge about locations, practices and basic metrics (H3). Furthermore, the lack of societal structures resulted in security threats that inhibited the organizations' ability to react quickly and engage fully with beneficiaries (H6, H7). Instead of profound engagement with those in the greatest need, respondents found it *"very difficult to actually get the things to where they were needed; they would just end up with some big shot"* (H4).

This humanitarian response was also characterized by a high level of ***uncertainty***, which inhibited the development of routines (H3). High flexibility was required to enable organizations and their SCs to respond to the constantly changing local demands (H10). Improvisation was often the only way to respond (H3, H8). Because of the pronounced non-routine nature of the response, interviewees found that commercial experience and knowledge was not applicable to logistics in Haiti (H3). Learning therefore had to occur mainly on the job, with very limited opportunities for standardization (H4, H5, H6). This uncertainty has an impact on the efficiency that HL is able to achieve:

"We try to make it as routine as possible, obviously, for a supply chain to be efficient, having unknowns really throws off efficiency, costs money, etc." (H8)

For the continuous development of HL practice, some routine is desirable, an element that respondents were not able to find in Haiti, which they described as an

unusual scenario, even in an emergency response to a major natural disaster (H5, H6, H9).

Another emerging theme was that the poor image of **supply chain management** inhibited learning and development of improved practices, which respondents claimed was particularly pronounced in this response (H3, H9). Interviewees agreed that improving the SC would improve the general provision of aid, particularly in an environment with very limited resources, such as Haiti (H7, H9). The high visibility of the logistics problems was however also seen as a positive point and maybe a hope for the future:

"The earthquake definitely changed the way that people view supply chain and really emphasised the importance of having a really strong, solid supply chain system." (H9)

However, others linked the obvious problems to a worsening of the image of SC management (H3, H7).

The pronounced challenges for SC management were closely tied to the lack of infrastructure and general lack of understanding for transport issues within the country:

"Haiti is generally, of the places I've worked, it's definitely the most challenging [...] I mean, America has challenges as well for logistics and supply chain but Haiti is definitely a unique case especially since it's so close to the US. I mean, it's amazing the challenges that exist there across the board, but just looking at supply chain and logistics you are 800 miles from the port of Miami and you've got ports in the Bahamas and Jamaica and Cuba, obviously, and it's ... and the Dominican Republic, which is right next door and their supply chain systems are just much more established" (H8)

Overall, both infrastructural and societal issues made this humanitarian response a particularly challenging and non-routine one for all of the organisations represented in the sample for this case study.

4.2.4 No Clear and Quantifiable Specifications

The second part of the Dynamic Complexity half of the conceptual framework for MSCs is the aspect of *No Clear and Quantifiable Specifications*, which comprises the difficulty of accurately comprehending and documenting messy or wicked problems. Participants highlighted issues that fell under the main themes presented in Table 21.

Table 21: No Clear and Quantifiable Specifications

Out-dated information	Had organisations struggling to assess the situation accurately
Supply chain performance	Was positively impacted by the use of actual, accurate data in this humanitarian reponse
New sources of information	Were something respondents were keen to engage with for example through social media and academic consultants
Information technology	Was used to enable a better understanding and management of HL

While not all of the respondents highlighted each of these themes as a particular challenge for HL, all but one commented on this aspect of the framework.

In a humanitarian response, the efficiency and effectiveness, particularly in the initial stages, can be severely hampered by ***out-dated*** information on which plans and actions are based (H2, H3, H10). Especially in a disaster response like Haiti, up to date information is impossible to find, much less to synthesise into meaningful data that a robust operational plan can be based on (H10). In some cases, even when every effort is made to collect pertinent data centrally, by the time it is distributed and ready to be used in the field, logisticians find themselves working to situations that have since changed significantly, thus resulting in inadequate needs assessment (H2, H3). It was highlighted that external sources of data are often not adequate or suitable for the particular challenges of HL and that an effective response often depends on own research and experience (H7, H10).

"Most of the time when you look to reports it's data from two years ago and it's difficult to say 'okay, this will happen; these are the different options or these are the different...' and they say 'okay, we need two billion'. Two billion to do what? How many in the country, how many workers in each country, what is this, this and this? So we really have a lack of information, of planning information." (H10)

Whenever it is available, the use of actual, accurate data has a very positive impact on ***supply chain performance*** in the humanitarian response, which has put data collection into the focus of many organisations (H3, H7, H9, H10). To raise the profile of logistics within humanitarian organisations, it is essential to *"demonstrate the contribution of supply and logistics [...] [through the use of] databases, facts and figures"* (H3). Data collection, particularly in relation to demand within a particular

humanitarian response can have thoroughly positive effects on purchasing accuracy and forecasting ability (H3, H9).

"Now we're getting more data about patient visits, we're getting more data about what drugs we are prescribing, which drugs we stock out of, and so coupling data coming from this electronic system, but also with the actual context and knowledge of the staff that have been doing this work for years is essential" (H9)

In explaining how their organisation ended up with £3.5 million of obsolete stock in Haiti, one interviewee states:

"There was no visibility, people couldn't even see what was in the warehouses; so in the different warehouses that we had, people were diligently writing the stock inventory cards, whatever, but the sheer effort involved in consolidating that information and making sure it is available with plans at the moment... that is very difficult to keep up with if you don't have information technology" (H3)

It is essential for organisations to understand the way information flows not just within their own operation, but also along their SC in order to improve performance (H10).

Respondents were keen to engage with ***new sources of information*** such as academic consultants and social media (H1, H4, H7, H10). There is a clear awareness that the information base needs to be improved in order to progress the development of HL, and that a variety of inputs from various views can contribute to this most effectively. Researchers can contribute valuable skills in data analysis and are generally able to provide a longer-term view that might be less focussed on operational details and thus capture some of the underlying issues that complicate HL (H1, H10).

"In our work we take that research or intellectual angle which I think is quite different from a lot of organisations [...] so we can really understand what is happening and we have the better information. You have to use what's on the ground, all the manuals and guidebooks and all that, that just doesn't work." (H1)

As organisations struggle to access relevant data in a timely manner, social media can make an important contribution, as services such as twitter capture the mood and concerns of the affected population instantaneously. With the help of sophisticated technology, some organisations have started to monitor such sources of information and have found that they enable them to react more quickly and pinpoint demand in greater detail than they could previously (H4, H7).

Recently, due to a better awareness of logistics and its contribution to overall performance, organisations have started to put ***information technology*** into place to

enable a better understanding and management of HL (H3, H6, H8, H9, H10). Great improvements have been seen by providing accurate and timely data through the use of IT (H9, H10). However, it can be difficult to make such investments, as they are contingent on continuous funding (H6, H8).

"We've been really moving towards trying to get inventory managed electronically and we had an in-house team of designers make [...] an inventory management system and we had it designed in-house, it was designed to our specifications. Of course to buy a supply chain software to meet our needs would have cost hundreds of thousands of dollars and so it was a several year process and it's still not completely finished" (H9)

However, data always needs to be seen in context, so the mere capture of information is not sufficient for successful supply chain planning and needs to be supported by experience and contextual information that staff provide (H8, H9).

"There are just things that aren't captured, like, let's say, we know in the rainy season cholera cases go up, but the data that we're using to make a purchase is from the seven months before the rainy season starts. It's essential to have our staff on hand" (H9).

4.2.5 Multitude of Diverse Stakeholder Views

Moving now into the *Behavioural Complexity* half of the conceptual framework, the next aspect to be discussed is the Multitude of Diverse Stakeholder Views. *Behavioural Complexity* deals with the social properties of wicked and messy problems, the ones that directly stem from human interactions within the problem situations.

Table 22: Multitude of Diverse Stakeholder Views

Beneficiary involvement	Was seen as crucial in a very complex situation in a country that was already deeply impoverished before the earthquake
Media attention	Was a key determinant of donor involvement, as well as the number and experience of the humanitarian organisations involved
Accountability to donors	Was an important stakeholder pressure shaping and guiding the performance of HL
Military support	Played an important role in organising the humanitarian response in Haiti, but also created tensions

These properties were much discussed by the interviewees in the Haiti case and four main themes emerged in the course of the primary research. They are summarised in Table 22.

This section further expands upon each of these themes that present important parts of behavioural complexity as a part of the MSC framework, making use of quotes from the various interviewees to illustrate key points.

Beneficiary involvement is seen as the most crucial aspect of stakeholder management by the respondents owing to the very complex situation in a country that was already deeply impoverished before the earthquake (H1, H2, H4, H6, H9). Many organisations regard it as their primary mission to engage with a wide range of beneficiaries, using strong local knowledge and manifold interactions on the ground (H2, H4, H6).

"We are all about empowering people. That's very important for us and we engage with civil society for that. We work with lots of different groups. We support them in the work we do and help them develop. People need to be included in the decision making process." (H1)

However, a lack of engagement is criticised in competitors, highlighting an over-reliance on wider political priorities and the whims of the donors rather than any actual engagement with the local communities (H1, H2, H9).

"We are mainly concerned with aid reaching the beneficiaries. Which it often doesn't. A lot of it gets lost. Haiti is probably the prime example for how the international aid industry — it really is an industry! — can create even more of a disaster." (H1)

Furthermore, respondents are concerned with the longer-term impact of the aid they deliver and show a great awareness of the criticism that has been aimed at humanitarian aid for being post-colonial and actively engaged in disempowering people and destroying local markets (H4, H9).

"Our mission is to really bolster the public sector so we're not building private facilities all over the country, we want to help strengthen public facilities." (H9)

In the interest of a circular SC, this is also a sustainability problem, as recovery and reverse logistics increase in importance in order to not *"be competition for local providers in the long run, so we don't want anyone to get their hands on free equipment"* (H4).

As had already been highlighted by respondents in the initial round of interviews, this particular humanitarian response was significantly influenced by the high ***media***

attention that was a key determinant of donor involvement, as well as the number and experience of the humanitarian organisations involved (H1, H4, H5, H8). Haiti was seen as an anomaly among respondents as the media engagement was extremely high and resulted in a significant influx of donations, in sharp contrast to other disaster responses in the same year that struggled for funding (H6, H8, H9).

"Earthquake Haiti, everybody wants to donate everything, but other areas don't receive quite as much media attention, it's a lot more difficult." (H5)

However, respondents also highlighted that there are only certain areas that are well-funded thanks to increased media attention, and that it is particularly evident along the SC that not every part of a humanitarian response is attractive for the media and ill-reported aspects do not attract funding, even in a well-publicised disaster like Haiti (H3, H9).

"The international part, that's fine and they have the big sponsors for that and it's all very flash, but once you get to Haiti that's all gone. It's not sexy any more and you don't find any sponsors either, so that's when you get the real disaster." (H1)

Once again, the biggest concern for respondents was the lack of long-term development and Haiti was repeatedly cited as an example of a disaster response gone wrong because of the very high levels of media attention and the subsequent influx of humanitarian organisations that often had little skill or experience in handling such a complex disaster situation, nor any interest in lingering once the media spotlight had moved on (H1, H5, H6, H8).

"As long as the media is there, as long as everyone focuses on a big disaster or something, that's when [some humanitarian organisations] do work, but then the interest moves on [...] and the people lose out." (H1)

Respondents also pointed out that ***accountability to donors*** is an important stakeholder pressure shaping and guiding the performance of HL (H1, H2, H3, H5, H6, H9). In its most simplistic form, this is evident by a drive towards efficient use of resources as donors demand evidence of how their money is being used, thus increasing financial prudence and making an impact on efficiency in the SC (H1, H5, H9).

"It's not really just about the money, but if we can save huge amounts of money then it's better for our donors" (H2)

Furthermore, donor pressure can extend beyond the mere financial accountability, and result in specific guidance for the use of resources or the priorities that should be set in the field, a phenomenon observed in particular with large organisational or

governmental donors that make up the core of the funding of many humanitarian organisations (H2, H3, H6, H10)

As logistics and SC management is not necessarily an attractive area for donors to interfere with, it can face less scrutiny than direct interactions with beneficiaries, but does come to the attention of donors from time to time, particularly when access and transport become an obvious or media-driven concern (H5, H6, H9).

"What tends to happen is that we have a problem [...] and somebody gets really interested in beating up logistics in country; they do something about it and then things go well." (H3)

However, despite the obvious problems of the Haiti response, respondents found this to be an encouraging sign for HL, as the donor pressure to focus on and improve SCs increases, similar to the initial drive towards HL after the catastrophic handling of HL issues in the 2004 South-East Asian tsunami (H3, H5).

"The earthquake definitely changed the way that people view supply chains and really emphasise the importance of having a strong, solid supply chain system." (H9)

Given the high complexity of the situation and the thorough destruction of any existing infrastructure, ***military support*** played an important role in organising the humanitarian response in Haiti, but also created tensions (H5, H7, H9, H10). There is some acknowledgement that military forces are best placed to, and have superior training in, taking action in circumstances where infrastructure is quite so severely limited, and it might even be possible for humanitarian organisations to benefit from their expertise and learn to improve their own operations accordingly (H10). In Haiti, US Army support was offered by President Obama and accepted by the Haitian president, to coordinate the influx of goods into the single airport in the country, which was clogged up with aid deliveries and not utilising its capacity due to inefficient air traffic control (H9). Interviewees recognised that this presented essential support that enabled humanitarian organisations to better coordinate their efforts and ensured desperately needed supplies could actually enter the country (H7, H10), but also voiced concern over the undue influence of a foreign military power shaping the fate of a sovereign nation (H5, H7).

4.2.6 Sociopolitical Impact

The final aspect of the MSC framework is *Sociopolitical Impact*. Forming the second part of the Behavioural Complexity half, it is particularly closely linked to the

Multitude of Diverse Stakeholder Views aspect introduced above. Interviewees discussed several themes relating to this aspect as highlighted in Table 23.

Table 23: Sociopolitical Impact

Global political priorities	Determined the amount of attention and resources the humanitarian response receives and need to be managed carefully
Government of Haiti	Was criticised for uncooperative behaviour, exerting its sovereignty particularly in regards to the import of humanitarian supplies
Neutrality	Was a concern, especially in the interactions between the many humanitarian organisations present in Haiti
Sustainable changes	A lack of willpower in making sustainable changes in the political and social landscape in Haiti was observed

This section expands upon these four themes by summarising key points from the interviews and presenting quotes in support of these points, thus exploring the existence of this aspect of the MSC framework in HL.

An influential, but distant stakeholder groups are governments and, as such, politicians around the world, an influence particularly acutely felt in Haiti as ***global political priorities*** determined the amount of attention and resources the humanitarian response received and had to be managed carefully (H1, H7, H8, H10). This particular humanitarian response is regarded as highly politicised and utilised by leaders around the globe to push their own agendas, which resulted in considerable frustration among the respondents who regarded such behaviour as a betrayal of humanitarian ideals.

"We really try to help the people first and foremost. There are organisations who really don't focus on that! They are mostly political. Look at [humanitarian organisation], they just funnel US funds across the globe, all depending on what the political priorities are at the moment." (H1)

Most importantly there is a concern for the sustainability of projects initiated based on political agendas rather than interaction with beneficiaries and recipient communities (H2, H7, H8).

"There is no long term projects if you do that, if you follow the politics. That doesn't make much of a difference then." (H7)

Participants voiced great concern that such a lack of engagement had severe negative impact on the resilience of the affected communities and pointed out the destitute situation Haiti finds itself in several years after the earthquake as evidence of the devastating effect of a focus on politics in humanitarian aid (H1, H6, H8).

Interviewees observed that the national ***government of Haiti*** had been criticised for uncooperative behaviour, exerting its sovereignty particularly in regards to importing humanitarian supplies (H1, H3, H7, H9). With quickly changing regulations and shifting responsibilities among local officials, import constraints are a common concern (H1, H3, H9).

"We've had containers stuck in customs for months on end in Haiti for reasons that are unclear to us and I don't know if that's politics at play or just inefficiency of the systems or something else. Because we're an NGO we do not pay any bribes or anything like that so I can't actually speak to what it's like to be a private entity trying to move textiles for instance." (H9)

However, other respondents highlighted that such concerns are dramatized and that the import regulations are essentially a necessary assertion of Haiti's sovereignty as the country was inundated by humanitarian organisations.

"It doesn't take much research to find internet videos or other things of people trying to get supplies through into Haiti and getting blocked by the government or something — I think that reports of that are extremely overblown and I think that what the real... you know, yes, there are changing laws there; yes it can be cumbersome and I think there are barriers to getting supplies into the country that don't exist in other countries, but think about it [...] I imagine the UK is similar with their sea ports and importing stuff" (H7)

"In Haiti, after the earthquake, you had thousands of NGOs that were just shipping stuff in and would get upset when the government was making these organisations follow the laws of importation and customs regulations, whereas, if we were shipping something to the UK [...] you would never expect that a container of supplies would not go through a customs process" (H8)

Furthermore, it was acknowledged that especially in the immediate aftermath of the earthquake, regulations were relaxed significantly, particularly for known humanitarian organisations with an established presence within the country (H1, H9).

"After the earthquake, politics made it possible for us to, because we are a known NGO, we've been working in the country for 25 years at the time of the earthquake,

we're a well-known organisation, we were able to get pretty much blanket authorisation to import and get supplies into the country because we were trusted." (H9)

Given the large scale of the humanitarian response to this particular disaster, interactions between the many humanitarian organisations present in Haiti have been challenging and ***neutrality*** is a concern (H1, H6, H7). While some organisations are very open in their approach to lobbying, describing it as essential to *"work with the governments and the ones that decide where the money goes [...] try to make the voices of those who are actually on the ground in Haiti heard"* (H1), others are very sceptical of any political engagement insisting that their neutrality is their very raison d'être (H2, H7). However, in practice during the Haiti disaster response, respondents questioned the existence of the humanitarian principle of neutrality.

"Any interactions with the many aid organisations in Haiti are always politically dangerous and difficult. They all claim they are neutral and all that, but they are not." (H1)

"Neutrality and all that rubbish... those are all fine principles, but it is a very political context and everybody who does not admit that is simply telling lies." (H6).

A lack of willpower in making ***sustainable changes*** in the political and social landscape of Haiti has been observed both among humanitarian organisations and local structures (H1, H2, H6, H9, H10). Respondents have observed an attitude among humanitarian organisations that is not focussed on actually improving the situation within the country, often actively contradicting or evading local governance structures (H1, H9, H10).

"Basically, you are weakening the system even further and we really strive to work directly at the invitation of the Government of Haiti" (H8)

The experience with this particular humanitarian response has disillusioned several of the respondents due to the complete disregard many organisations have shown for the sovereignty of the Haitian state and the disinterest in bringing about real improvement for the affected population (H1, H2, H4, H6, H9).

"Haiti is known as the Republic of NGOs [...] you have all of these entities operating within a sovereign country that are not really listening or following the directives of the sovereign country, an —albeit questionably— democratically elected, but nonetheless a democratically elected government" (H9)

This has lead one respondent to a sobering conclusion that questions the morale and motivation of the whole humanitarian sector:

"The NGOs really don't want to be held accountable. There is just too much they don't want anybody to know, especially when they are working in a place like Haiti. You just don't challenge the status quo. It's bitter, but it's true; nobody has an interest in making things better. They have an interest in keeping their own jobs, that's all. And they keep their jobs if they keep the people in the country small and the suffering continues." (H1)

4.2.7 Summary of the Haiti Case Study

Section 2 of this chapter has provided a summary of the findings obtained from the ten interviews of the Emergency Response to the January 2010 Earthquake in Haiti case study, in accordance with the *Redescription* stage of RRREI. Evidence of all five characteristics of the proposed conceptual framework for MSCs was found within the data gathered as part of the case study. This contributes to addressing Research Objective 3 by exploring the proposed conceptual framework in the context of HL. Figure 27 summarises the key themes identified.

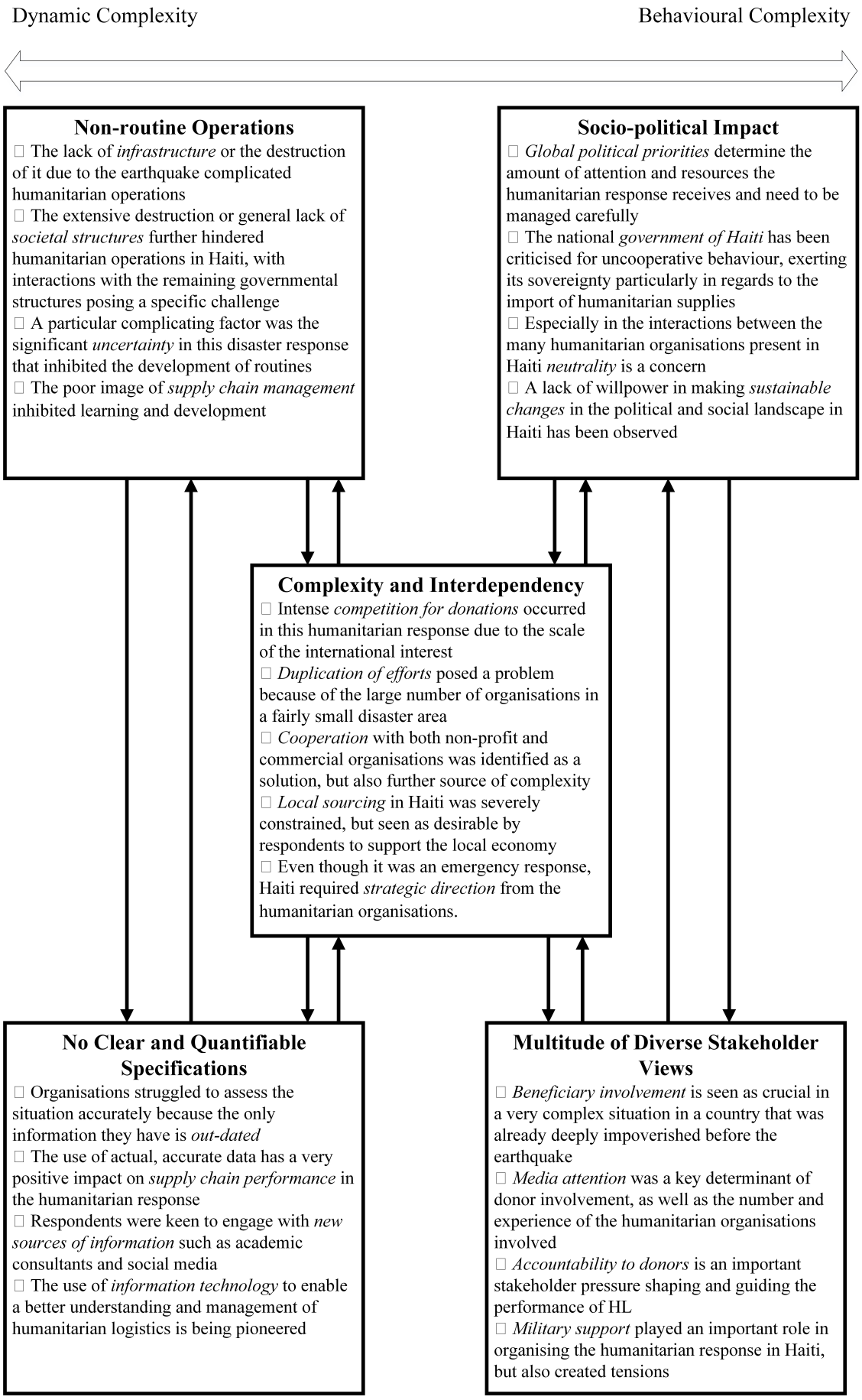


Figure 27: Summary of Key Themes Identified in the Haiti Case Study (author's own figure)

4.3 Emergency Response to the July 2010 Flood in Pakistan

In contrast to the Haiti case study, the emergency response to the July 2010 flood in Pakistan was seen to be particularly pertinent due to the lack of media attention and extensive global aid. As both emergency responses occurred in the same year, respondents were able to give a similar long-term view of the response and its impact and outcomes.

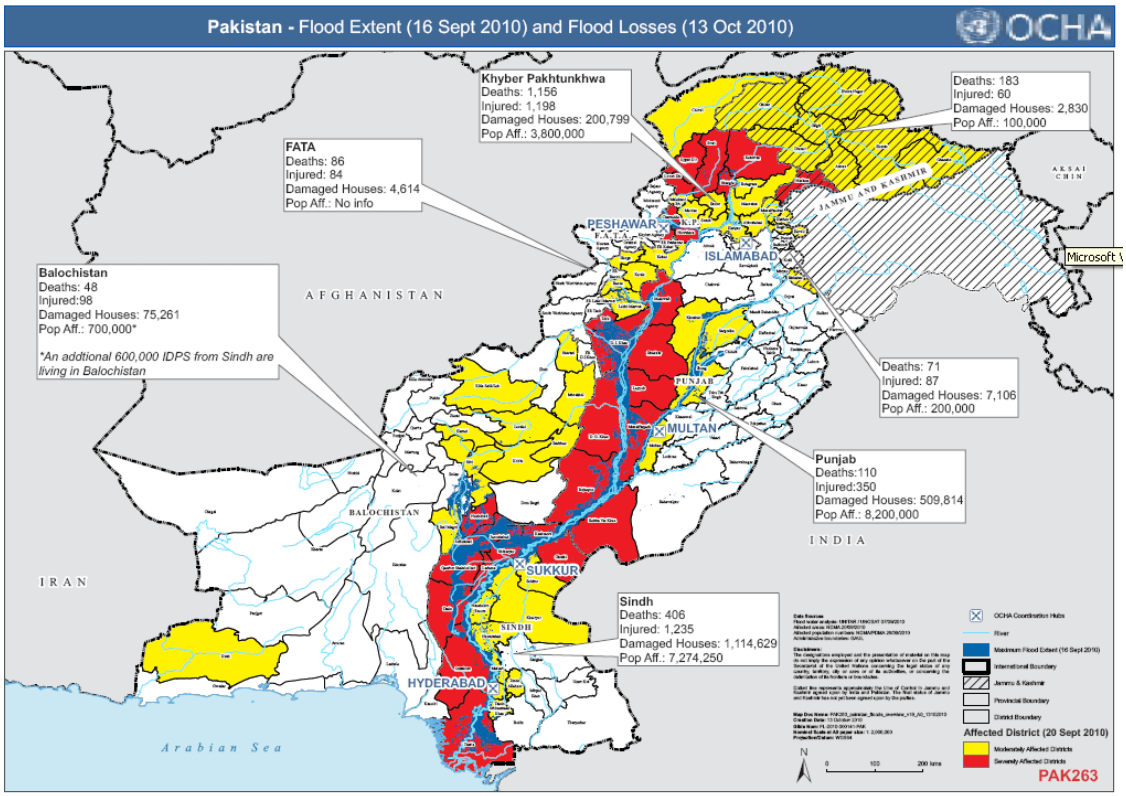


Figure 28: Map of Flood Extent (16 Sept 2010) and Flood Losses (13 Oct 2010) (International Development Committee 2011)

On the 26th of July 2010, heavy monsoon rains in several regions of Pakistan resulted in a major flood in the Indus River Basin, with water covering up to 20% of Pakistan's total surface area, and not receding until the autumn (Singapore Red Cross 2010, International Development Committee 2011). Figure 28 shows a map of the flood extent and the flood losses as per autumn 2010. The Em-Dat database lists the number of total deaths as 1,985 with 13,400,000 people affected and total economic damage of US$ 9.5 billion, thus affecting significantly more people than the earthquake in Haiti in the same year, but causing less deaths and economic damage ('Disaster Profiles' 2015). It is estimated that more than 12 million people were displaced and 1.7 million homes were either damaged or destroyed completely, which, while floods are not uncommon

in Pakistan, demanded a humanitarian response on an unprecedented scale, putting strain upon the resources of both humanitarian aid organisations and donor countries that were already stretched by the Haiti earthquake earlier in 2010 (International Development Committee 2011). The scale of the damage resulted in the largest appeal in the history of the UN, as the Government of Pakistan requested US$459 million for a three-month period and a funding requirement of US$ 1.9 billion was identified for a one-year period (International Development Committee 2011).

4.3.1 Introduction

Eight interviews are part of the Emergency Response to the July 2010 Earthquake in Pakistan case study (for the sake of simplicity called Pakistan case study from hereon). These interviews were conducted with individuals from eight different humanitarian organisations, including two small and six large organisations, a ratio that is notably skewed towards the large organisations. As in the other rounds of interviews, the gender balance was skewed due to the lack of female logisticians. The interviewees work at headquarters of humanitarian organisations or in the field with an even spread between the two areas. Furthermore, five of them self-identified as logisticians, while the remaining three had a close relationship with the logisticians within their organisations. Table 24 summarises this information for all participants in the Pakistan case study.

Table 24: Participant Characteristics in Pakistan case study

	Organisation Size	**Gender**	**Position**	**Job Description**
P1	Large	Female	Field	Other
P2	Small	Female	Field	Other
P3	Small	Male	Headquarters	Logistician
P4	Large	Male	Field	Logistician
P5	Large	Male	Headquarters	Logistician
P6	Large	Female	Field	Other
P7	Large	Male	Headquarters	Logistician
P8	Large	Male	Headquarters	Logistician
SUMMARY	*2 small* *6 large*	*3 female* *5 male*	*4 headquarters* *4 field*	*5 logisticians* *3 other*

To protect their anonymity, informants are only identified by an alphanumerical code, where "P" stands for participation in the Pakistan case study and a number is assigned at random to each interview. Numbers have not been assigned according to the

order in which the interviews were conducted, nor according to any characteristic of the interviewees.

Informants were involved in the humanitarian response to the previously described natural disaster. Most respondents had worked in Pakistan before the floods, and some organisations had extensive networks within the country. At the time of interviewing all organisations still had a presence within Pakistan, even though the majority of the interviewees had since returned to their home countries or were employed in humanitarian responses in a different country.

4.3.2 Complexity and Interdependency

As the central aspect of the conceptual framework for MSCs, *Complexity and Interdependency* combines both *Behavioural Complexity* and *Dynamic Complexity*. Evidence of the presence of this aspect has been provided in the primary data gathered as part of the Pakistan case study. Interviewees highlighted four areas of particular concern in regards to HL in this humanitarian response, which are highlighted in Table 25.

Table 25: Complexity and Interdependency

Bureaucratic hurdles	Significantly impeded the work of humanitarian logisticians
Continuity and coordination of sourcing	Proved to be particularly difficult as organisations struggled to move aid deliveries into the affected area
Duplication	Coordination among agencies was necessary to avoid duplication but often proved unreliable and challenging
Competition between agencies	Existed on both the donor and the beneficiary side of the humanitarian response

These four themes are discussed in detail in this section incorporating quotes from individual interviews as illustrations of particularly pertinent issues that relate to this aspect of the conceptual framework of MSCs.

Bureaucratic hurdles significantly impeded the work of humanitarian logisticians (P1, P2, P4, P8). It was acknowledged that the initial response by the Pakistan government and military was swift and well coordinated, but the sheer scale of the disaster made it impossible to tackle on a unilateral basis.

"In Pakistan the government and the military, with previous experience of responding to natural disasters from the 2005 Kashmir earthquake, were able to respond quickly and save lives, which might otherwise have been lost. Unsurprisingly, its limited national disaster preparedness and management capacity was unable to match the immense scale of need." (P8)

However, in the context of international aid, interviewees noted the difficulties of finding the correct person to address and manoeuvring through a quagmire of bureaucracy, which slowed down the delivery of humanitarian aid (P1, P4).

"There is definitely a lot of admin to be done [...] there is a special admin person for everything and you have to know them all, so they play a major role." (P2)

Respondents noted that the way in which administration was handled *"was perhaps too complex, relying as it did on an overly bureaucratic and inflexible system"* (P8). Furthermore, a cultural component to the delays and difficulties experienced was insinuated:

"Of course people would never say why you couldn't do something, but it was impossible. And often everything just seemed to be impossible. That is the default reaction to any new thing. It's impossible. Starting anything new is a very long process." (P2)

Continuity and coordination of sourcing proved to be particularly difficult as organisations struggled to move aid deliveries into the affected area (P1, P3, P4, P6, P8). Respondents highlighted that their *"biggest issue is the way of sourcing and the continuity"* (P3). It was noted that local sourcing is very much desirable for the ease of logistics, avoidance of additional import costs, as well as the general concern with supporting, instead of undermining, the economy of the affected area, but interviewees pointed out the difficulties of sourcing locally in a country that had been devastated to such a scale as Pakistan in these floods (P1, P3, P6). Furthermore, it was highlighted that large agencies especially can utilise economies of scale and long-standing agreements with suppliers to ensure that the best value for money is delivered to the beneficiaries through global procurement contracts (P4, P8).

In sharp contrast to the Haiti case, a particular problem was the continuity of funding to this particular humanitarian response (P1, P3, P8). Given the immense scale of the request for aid that had been issued to the UN, distribution was poor and other agencies too struggled to fulfil their pledges of assistance in the aftermath of the floods (P4, P7, P8). The following quote provides a striking illustration of the slow distribution of funds:

"A year later there were still millions of people in need of humanitarian assistance, especially in Sindh and Baluchistan, still living in camps, just waiting for some funding to help rebuild their lives. Millions of people still waiting and the UN has not even distributed half of that appeal, that's just unacceptable." (P8)

Coordination among agencies was necessary to avoid ***duplication*** but often proved unreliable and challenging (P1, P2, P4, P6, P8). Particularly in a humanitarian response of this scale, there is an awareness that many organisations are working towards the same goals and often end up doing identical work or faltering at the same problems without being aware of this:

"It was a very remote area, but there were still quite a few Western organisations and coordinating their activities and just knowing who was there and doing what, that was quite a job." (P2)

Respondents highlighted that they saw a large need for better cooperation, collaboration and coordination between agencies to enable them to better respond to large-scale disasters.

"What would really help I think is more collaboration between agencies [...] a lot of projects across all agencies need the same things and if we could collaborate more, that would be easier." (P1)

"There is very little cooperation. [...] we need to stop replication and draw on each others' strengths" (P6)

These points had all been raised after the humanitarian response to the 2005 earthquake in Pakistan, which had resulted in similar concerns and problems, and therefore the UN took a cluster approach in 2010 (P1, P8). However, working in the clusters was often regarded as a waste of time with no added benefit to the organisations (P1, P2, P4).

"The performance of the cluster system was mixed [...] There were too many NGOs and other agencies at some meetings to make clusters effective [...] clusters should focus on providing strategic sector leadership [...] only those agencies with operational experience and a proven record in the sector should be involved in cluster meetings and that information should be shared with others in a less resource intensive manner." (P8)

Nevertheless, coordination of efforts remains a large problem, especially in a disaster response of this scale. Furthermore, taking a more collaborative approach would fit with the local culture as one respondent highlighted:

"In these cultures, it is much more about collaborating and developing something together. (P2)"

There was intense ***competition between agencies*** on both the donor and the beneficiary side of the humanitarian response (P2, P4, P6). Respondents intimated that particularly in an environment like Pakistan, the system of humanitarian organisations could change quickly.

"*The network is always evolving, always changing and you have to go with that."* (P2)

It is regarded as essential to maintain connections with local decision makers that are better than the relationships they have with other humanitarian organisations.

"It's all to do with your connections and our local liaison officers [...] there are people who know people. And you'd be surprised, if you don't have those connections you can either not get in or [get kicked out]" (P4)

Therefore it is essential in interactions with external partners to stay ahead of other agencies. While the need to collaborate and to avoid duplication of efforts is acknowledged widely, as previously presented, humanitarian organisations are in competition with each other and working together is often not seen to be in their best interest (P1, P2, P4). Competition is fierce, and as one respondent phrases it pertinently:

"It's important for every organisation to get a foot in the door. On their own. With their logo on it." (P6)

4.3.3 Non-Routine Operations

Non-Routine Operations are part of the Dynamic Complexity half of the conceptual framework for MSCs. Key themes discussed by the interviewees are summarised in Table 26.

Table 26: Non-Routine Operations

Transport infrastructure	Destruction or lack in the area affected by the floods complicated humanitarian operations
Security concerns	Slowed down the response in this particular disaster
Uncertainty	Was a complicating factor in this disaster response that inhibited the development of routines
Problems with logistics	Were very pertinent in this response and resulted in a higher awareness of logistics in general, as well as the necessity of improvements in particular

These four themes are presented in this section illustrated by representative quotes taken from the eight interviews that were conducted as part of the Pakistan case study.

The lack of ***transport infrastructure*** in the area affected by the floods complicated humanitarian operations (P1, P2, P6, P8). This is very common, particularly in natural disasters, and organisations are experienced in improvisation in order to reach beneficiaries and set up supply lines (P1, P6). However, the transport infrastructure in some areas of Pakistan was never there to begin with or severely limited by the standards of the international humanitarian workers:

"In the area I worked in, there was a lot of agriculture and quite significant trade with Afghanistan, but it was all poppy seeds. They were transported across the mountains on the back of a donkey. So that's what you have for infrastructure. Everything that needs to reach these people has to go on the back of the donkey simply because there is no other infrastructure in place. There has never been any demand for it and there aren't the resources for it either. But that is hard to accept as a Westerner." (P2)

As transport infrastructure was so severely limited and damaged in the aftermath of the floods, many organisations relied on the military to gain access to the areas that had been affected the worst.

"There is a very important role for the military in helping people in the immediate aftermath of a disaster and in rebuilding damaged infrastructure quickly. The army in Pakistan was able to reach parts of the country which others were unable to and in so doing, significantly reduced the number of fatalities." (P8)

However, it was then also noted that the military controlled access through their ability to gain access and monopolised some of the existing transport infrastructure, further impeding access to certain areas (P2, P8).

Security concerns slowed down the humanitarian response in this particular disaster (P1, P4, P6, P8). Pakistan in general was an area for extensive security stabilisation interventions by the international community, and various western military forces had been employed in the region for numerous years (P8). Furthermore, there are many security concerns within the country that the national military addresses in several of the areas affected by the floods (P2). Respondents acknowledged that *"in Pakistan it was difficult, we had very stringent security"* (P1) and that *"depending on the security situation, we cannot even leave our compound"* (P6). As strategies to stay safe in that environment, respondents highlighted the need to build strong local networks (P1, P2, P4, P6).

"You have to have very strong relationships. They keep you safe and make it possible to run the project and to get the supplies we need." (P1).

"*There are also other local NGOs to consider, that's important even if you don't formally cooperate, you need to know what is going on and that's also important for security reasons."* (P2)

The need to stay safe often triggers extensive cooperation with the military, even though this is not seen as desirable from a humanitarian point of view, and makes operations more complex (P2, P8).

"You have to travel under security, often work very closely with the military so that slows everything down a lot. Just every simple little decision becomes so much more complex." (P2)

A particular complicating factor was the significant ***uncertainty*** in this disaster response that inhibited the development of routines (P1, P2, P5, P7). Respondents described the environment as "volatile" (P1) and "an uncertain business" (P7). In particular, they highlighted the lack of adequate information to enable even a modicum of planning in a very complex disaster, and the issues that came with responding to a humanitarian crisis in a highly political environment where the implications of an action upon the wider political landscape were often unclear, but each decision could potentially have major repercussions in regards to the security of the workers in the field, as well as the wider political context (P5). The only ones able to develop a routine were organisations with a long-term presence within the country.

"I was in Pakistan for 4 years, so I really got to know the environment, I worked a lot with local staff. Well, there basically were hardly any Westerners in the regions anyways, so I developed some really close friendships and had very good connections as well with the military there and the likes." (P2)

This was seen as an opportunity to gather sufficient knowledge to enable logisticians in particular to make informed decisions even after the disaster had occurred (P2, P5).

Problems with logistics were very pertinent in this response and resulted in a higher awareness of logistics in general, as well as the necessity of improvements in particular (P1, P5, P7). In such a volatile environment where both sourcing and distribution can be a struggle, interviewees acknowledged that *"You are much more aware of logistics."* (P1), highlighting the struggles every part of the humanitarian response faces when logistics is faced with overwhelming issues such as impeded access to affected regions (P1, P5). Learning was generally difficult because the

response was under so much pressure and operating in such a vulnerable environment (P1, P4, P7). However, some organisations (P7, P8) nevertheless used their response to the Pakistan floods as an exercise to implement improvements based upon the lessons learned in the Haiti earthquake earlier the same year. One interviewee highlighted the significant improvement the implementation of an inventory management system that first became apparent in Pakistan:

"We did that emergency response in 2010, quite a big operation, one of our largest emergency interventions [...] since I've joined. At the end of that we had surplus inventory of about £150,000 which was very neat." (P7)

The respondent contrasted this achievement with their Haiti response that left the organisation with £3.5 million of surplus inventory.

4.3.4 No Clear and Quantifiable Specifications

The aspect of *No Clear and Quantifiable Specifications* represents the second part of the Dynamic Complexity half of the conceptual framework for MSCs. It relates to the difficulty of accurately comprehending and documenting messy or wicked problems. Comments from the participants fell into the main categories highlighted in Table 27.

Table 27: No Clear and Quantifiable Specifications

Impact assessment	Proved to be almost impossible, while organisations are able to measure input and output, the actual impact of their work remains unknown
Accurate record keeping	Was too time intensive in a humanitarian response even when an awareness of its importance exists Slowed down the humanitarian response in this particular disaster
Stock keeping	Represented a major financial concern for humanitarian organisations in disaster responses such as Pakistan
Local knowledge	*Local knowledge* is of vital importance in coordinating and instigating a humanitarian response and provides the best source of information

Impact assessment proved to be almost impossible. While organisations are able to measure input and output, the actual impact of their work remains unknown (P2, P3,

P8). There is usually a good understanding of centralised events within the SC and a general overview of the input and output of each humanitarian response an organisation is involved in, but impact assessment needs to be done at a local level and is therefore much less formalised and dependable, giving organisations a fragmented and unreliable understanding of their work (P3). The lack of a longer-term understanding of the impact is particularly evident in a complex and highly political context such as Pakistan:

"Our work certainly brought a lot of employment to the region. Whether that was temporary or a permanent improvement is really impossible to know, but there were lots of little effects. The broader impact, that is very difficult to assess… mainly because it is all so tied up with the wider political landscape. It is all just a very small part in a much larger picture." (P2)

The understanding organisations have of their own work, and the metrics they report to donors and other interested parties, usually does not include impact assessment, even though the desirability and even necessity of such measures is appreciated (P5, P8).

Accurate record keeping is too time intensive in a humanitarian response even when an awareness of its importance exists (P1, P7, P8). This importance was widely acknowledged, as organisations understand that information about their supplies and usage is essential to allow them to run their operations efficiently and effectively, but supplying accurate records is a challenge.

"Accurate record keeping is a problem... need to find a way to do that without taking away time and focus from the patient." (P1)

"It's not really a focus. Everyone is there to help the people, the focus is on the patient, not on the records. But continuing monitoring of consumption would be so important." (P5)

Furthermore, it is acknowledged that collecting such information can also serve to enhance the understanding of the role of the SC to a humanitarian operation as data can *"demonstrate the contribution of supply and logistics is making in an organisation"* (P7).

Stock keeping represents a major financial concern for humanitarian organisations in disaster responses such as Pakistan (P4, P5, P7, P8). The previously mentioned example of a humanitarian organisation drastically reducing its amount of obsolete stock at the end of a disaster response from £3.5 million in Haiti to £150,000 in Pakistan has served to illustrate the potential savings associated with a good understanding of the flow of goods in HL (P7). However, organisations struggle to gather the data needed for

such improvements due to the transient nature of the humanitarian response, where both supply and demand change very quickly and unpredictably (P4, P5). Particularly with the lack of funding experienced in the Pakistan case, losses through a lack of accountability for stock that was already within the country might have had devastating consequences for those affected by the disaster (P8).

Local knowledge is of vital importance in coordinating and instigating a humanitarian response and provides the best source of information (P1, P2, P4, P8). Respondents recognised this for both planning and executing their operations, in particular when a sustainable progress is desired.

"To operate sustainably, you really need the connections on the local level and that will inform planning as well." (P2)

Local knowledge can prove to be particularly important when local sourcing is an option for an organisation, as extensive network building is desirable:

"It's basically just using our local staff and local knowledge to go to all the different suppliers we possibly can." (P4)

Humanitarian organisations with a longer-term presence within the affected areas generally were able to provide a better response because of their in-depth local knowledge.

"Although the floods affected up to one fifth of the country, they had very distinct impacts in different parts of the country. The response in the north was generally quicker and more organised, largely because this area was affected by the 2005 earthquake and local disaster management capacities were better and there was a larger NGO presence." (P8)

However, respondents also acknowledged that such capacity building is time and cost intensive and thus not feasible for every humanitarian response, but pointed out the possibility to focus on particularly disaster-prone areas (P1, P2, P8).

4.3.5 Multitude of Diverse Stakeholder Views

Within the Behavioural Complexity half of the conceptual framework, the next aspect to be discussed is the *Multitude of Diverse Stakeholder Views*. Behavioural Complexity addresses the social properties of wicked and messy problems, the ones that directly stem from human interactions within the problem situations. This emerged as a key concern within the Pakistan case study with the key themes summarised in Table 28.

Table 28: Multitude of Diverse Stakeholder Views

Communication with donors	Was seen to be a challenge, in particular regarding the ear-marking of funding
Beneficiary involvement	Was limited because of the security concerns inherent to this particular humanitarian response
Military involvement	Created tensions in the highly political context of the response
Cultural issues	Were apparent, particularly in the non-linear approach to planning that was seen to be prevalent within the area.

Communication with donors was seen to be a challenge, in particular regarding the earmarking of funding (P1, P4, P7, P8). As previously mentioned, the disbursement of the funds requested happened slowly and haltingly in the Pakistan case study (P8). In a humanitarian response of this size *"there is no question that it is a struggle to keep all of that funded"* (P3) and respondents acknowledge that continuous funding is a key area they struggle with, particularly as media attention moves away from a longer-term disaster such as the floods (P4, P7). With the Haiti earthquake earlier in the year, the resources of many organisations were already stretched and the willingness and ability of donors to contribute to yet another major humanitarian response was questionable at best (P8). A lack of media attention was also blamed for the low level of donations experienced (P4). However, not all organisations found it challenging to raise funds for this response.

"We can go way over the top with far too much funding as we did in Pakistan [...] we just appealed for funding and there was massive funding. And our funding is earmarked to particular projects. In other cases, we struggle to finance." (P3)

This quote illustrates what other organisations observed in Pakistan (P1, P4, P7, P8). While there was sufficient funding within the organisations due to Haiti, the money could often not be used for this new response, as it was assigned specifically to Haiti. Organisations find it challenging to communicate with their donors and voice their actual needs for continuous and flexible funding (P4, P5, P7).

Beneficiary involvement was limited because of the security concerns inherent to this particular humanitarian response, despite organisations realising that it is essential for the sustainability and impact of their work to have closer interactions (P3, P6, P8). It is essential to establish such communications to assess needs and respond most adequately.

"We would never parachute into a church, into a country, and determine for ourselves what the need is. It is not a central, formalised process, there is some agreement." (P3)

However, safety of the workers in the field is paramount and respondents acknowledged that *"depending on the security situation, we cannot even leave our compound"* (P6). Limited interaction with beneficiaries does carry the risk of jeopardising humanitarian principles, as safe areas and groups of people are prioritised, rather than those in most need of assistance (P8).

"If you do not prioritise it on the basis of need, firstly you miss the neediest, because it is directed according to other priorities, and secondly, you actually make the aid itself ineffective, because the identity and perception of those who are delivering the aid becomes compromised in the mind of the recipients. That threatens security, and that threatens access." (P5)

From this quote it becomes evident that while interacting with the local population might pose a security threat, failing to do so has the same consequences. The same is also true about support from the military in reaching affected populations, which some organisations view as acceptable and even necessary in certain situations (P4, P7, P8) while others object strongly (P1, P2, P5).

"We strongly support key humanitarian principles of neutrality and impartiality. Using military assets for the delivery of humanitarian assistance is generally an option of last resort in conflict-affected areas because the intentions of such assistance could be misconstrued." (P8)

The highly political context of the response resulted in significant ***military involvement*** that created tensions (P1, P2, P4, P5, P7, P8). On an international level, organisations were involved in global political and military action, as there were significant *"NATO-coordinated stabilisation efforts in the north and Afghan border areas"* (P8) at the time, and some felt that *"everything we did was a showcase of Americas involvement in Asia, it was highly political and of course there was military interest as well"* (P2). Military involvement consisted of Pakistani, as well as international forces. The Pakistan army had previously been employed in some of the affected regions in a defensive capacity, which resulted in tensions with the affected populations, as well as reports of denied access to certain areas for humanitarian organisations (P2, P5, P8).

"There is this very vulnerable population already that's been in a conflict for years, and then the flood affects them as well. That's when we faced the restrictions, in

Waziristan and in southern Punjab as well. There were some areas that were very poor before, but we were not allowed to start working in them." (P5)

However, the significant contribution of the national military forces especially in the immediate aftermath of the floods is also acknowledged as *"the Pakistan military played a pivotal role in the response across the country in rescuing the stranded population and providing the basic services"* (P3). Similarly, international military forces were deployed despite unease about humanitarian principles.

"We recognise that there are occasions when no other options are available to help people in need, and this may well have been the case with regards to the use of RAF aircraft to deliver bridges. [...]The role of the military, and particularly the British military, limited though it was, was enormously important." (P8)

Cultural issues were apparent, particularly in the non-linear approach to planning that was seen to be prevalent within the area (P2, P3, P4). One respondent from an organisation with a strong Christian ethos acknowledged that *"in Pakistan we have to be very careful [...] what we are doing, who we'd be working with there. A lot of the time it won't work if it's in the likes of Pakistan and that. Then we just work for poor people, economic development stuff and all that... but in other countries we would be overtly Christian."* (P3). However, the more important cultural differences for most organisations lay in the different approach to stakeholder interactions i.e. a lot more collaborative (P2, P4, P8).

"You've got to know everyone and then there is lots of talking, you have to involve everyone. There are major cultural differences." (P2)

The influence of this has been felt particularly prominently in planning longer-term relief efforts. While the initial emergency response is fairly standard around the world, cultural sensitivity and stakeholder engagement grows in importance the longer an organisation is operating in a certain area (P5, P8).

4.3.6 Sociopolitical Impact

The final aspect of the MSC framework is *Sociopolitical Impact*. Forming the second part of the Behavioural Complexity half, it is particularly closely linked to the *Multitude of Diverse Stakeholder Views* aspect introduced above. Interviewees discussed several themes relating to this aspect as highlighted in Table 29.

Table 29: Sociopolitical Impact

Political agendas	Had to be respected both locally and globally without becoming directly involved in them
Tribal structures	Played a very important role in reaching affected populations and ensuring the safety of humanitarian organisations
Government funding	As a key source of income for humanitarian organisations is often tied to political priorities and as such calls humanitarian principles into question
Neutrality	Organisations faced the challenge of maintaining it in a highly political context in very different ways

It is of vital importance to respect the ***political agendas*** both locally and globally without becoming directly involved in them (P1, P2, P3, P6, P7). While most organisations maintain their neutrality and political independence as a core humanitarian principle, there generally is an acknowledgement that for the continuity of their humanitarian work in a particular area, organisations need to respect the politics in the context they operate in to a certain degree (P1, P2, P3, P8).

"We have to respect the political agenda by keeping out of trouble. You have to work with the local restrictions." (P1)

However, humanitarian organisations also see their role as advocates for the people they interact with and take their task of influencing and shaping political agendas seriously (P5, P6, P8). There is an acknowledgement that humanitarian work can potentially drive political change for the better, especially since politics often directly affects the populations organisations work with. Some organisations even see this as a part of their work that is just as important as the immediate disaster relief (P5, P6).

"The political situation really needs to improve before anything else." (P6)

Within the context of Pakistan in particular, there is a significant historical background for the involvement of international humanitarian organisations, and a particular poignancy to military involvement (P2, P8).

"Especially as a Brit you have a lot of history there that is still very present in these countries. There is a huge awareness of history and traditions. Incredible sense of history. Also the political background in Pakistan [...] that's a very, very different way of working. There is a constant state of change in many countries, and change at a scale

that we are not really used to in Europe, so you need to adapt to all that. That plays a major role in any longer-term planning." (P2)

Tribal structures played a very important role in reaching affected populations and ensuring the safety of humanitarian organisations (P1, P2, P8). Some of the areas most affected by the floods are Federally Administered Tribal Areas and others have a very strong presence of local governance structures that are in some instances outside of the influence of the federal government of Pakistan, controlling access and mobility of humanitarian organisations on a local level (P8). This influences the ways in which organisations can operate significantly:

"In a country like Pakistan, there are also lots of tribal groups to speak to. Well, where I was was all tribal area, so it was important to work with those leaders because they are formally part of Pakistan, but really quite independent, so government staff are of limited usefulness." (P2)

"In Pakistan, there were lots of different groups. Here, you only hear about the Taliban, but there are so many more. Of course it is difficult to operate in such an area, but [humanitarian organisation] stays out of anything political. It's a completely neutral organisation." (P1)

As illustrated by these quotes, the necessity to engage with the local tribal structures in order to gain access to affected populations and to help them to the best of an organisation's ability, can bring organisations into conflict with the principle of neutrality.

Government funding as a key source of income for humanitarian organisations is often tied to political priorities and as such calls humanitarian principles into question (P2, P3, P4, P8). The humanitarian response to the floods in Pakistan received particularly high levels of government funding as the international community assembled to respond to the significant request for assistance (P8). Furthermore, this disaster was less publicised than for example the Haiti earthquake and as such attracted lower levels of donations from individuals (P4). However, while government funding can be beneficial in the speed and size of the initial response, it is also tied to political agendas, an issue that was particularly pertinent in Pakistan (P2). Western countries had long been engaged in stabilisation missions in the region, as well as military missions, and the temptation to use humanitarian engagement to improve the image of their nations, as well as to gain access to communities was evident (P2. P8). Concerns were voiced about the intentions of the humanitarian organisations involved in this response (P5).

Overall, a theme emerged for the humanitarian response to the Pakistan floods, that ***maintaining neutrality*** in a highly political context is a challenge that organisations have faced in very different ways (P5, P6, P7, P8). Generally, neutrality is seen as the fundamental principle of humanitarian work, and often as the only way to approach the work organisations do in a humanitarian response, especially in highly politicised contexts.

"We are neutral! Often that is essential. You have to be impartial just to gain access to an area." (P6)

While most organisations firmly insist on their neutrality, even if they closely cooperate with the military for practical reasons (P4, P8), they also acknowledge the intense politicality attached to their work, especially in a context such as Pakistan.

"There's a lot that's fluff, policy and other things and politics in these organisations but by and large we are probably a more political organisation than anything else." (P7)

Furthermore, there is an inherent political impact of humanitarian work, whether that is as a showcase of values and material advantages of the donor countries over the host country (P2, P8), or through lobbying and support (P5, P6). Both approaches can call the neutrality of a humanitarian response into question, but can also be a defining feature in the impact achieved.

"Our work has quite a political impact as well, as we will speak out about issues we encounter and often we will be the first to tell the rest of the world what is happening. That has retributions… It is not always possible to speak out. You have to balance if we'd do more good drawing attention to an issue or if that would lead to us being thrown out of the country, so we cannot help people there anymore… so we do not always speak up." (P6)

4.3.7 Summary of the Pakistan Case Study

Section 3 of this chapter has provided a summary of the findings obtained from the eight interviews of the Emergency Response to the July 2010 Floods in Pakistan case study, corresponding to the *Redescription* stage of RRREI. Extracts of the data were included in this section to illustrate particularly important aspects of the discussion in which the respondents engaged (Wolcott 2001). Evidence of all five characteristics of MSCs was found within the data gathered as part of the case study on the Emergency Response to the July 2010 Floods in Pakistan. This contributes to addressing Research

Objective 3 by exploring the proposed conceptual framework in the context of HL. Figure 29 summarises the key themes identified.

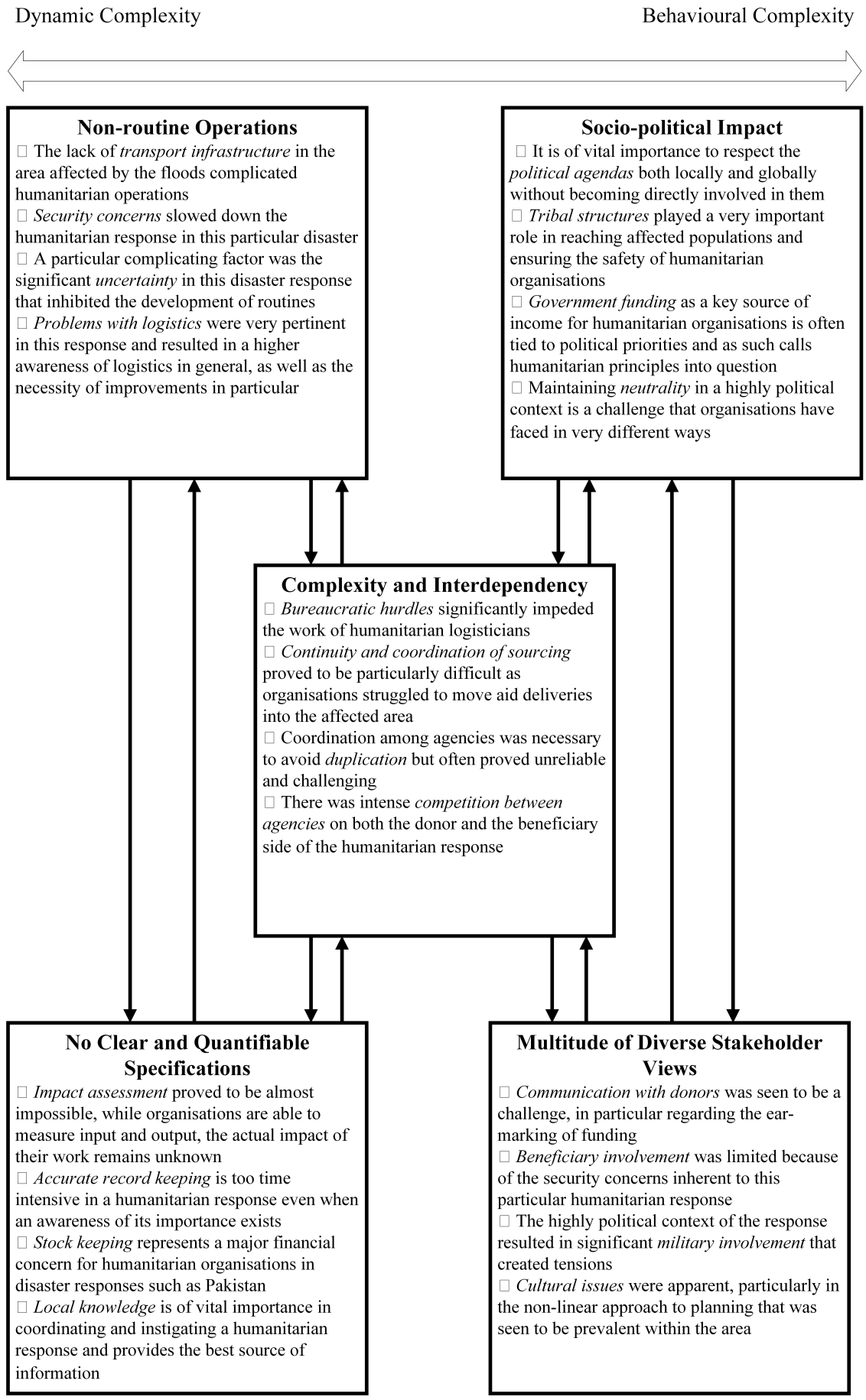


Figure 29: Summary of Findings from the Pakistan Case Study (author's own figure)

4.4 Developmental Humanitarian Response to Multiple Disasters in Sub-Saharan Africa from 2000 onwards

The final one of the three case studies is concerned with a developmental humanitarian response rather than an emergency response (Ragin and Becker 1992, Spring and Santos 2015). Humanitarian responses emerged as the most suitable unit of analysis to fully capture HL for this study. Respondents highlighted the distinct operational differences between emergency responses and developmental missions. As two emergency missions have already been presented in detail, the final case study focuses on developmental work.

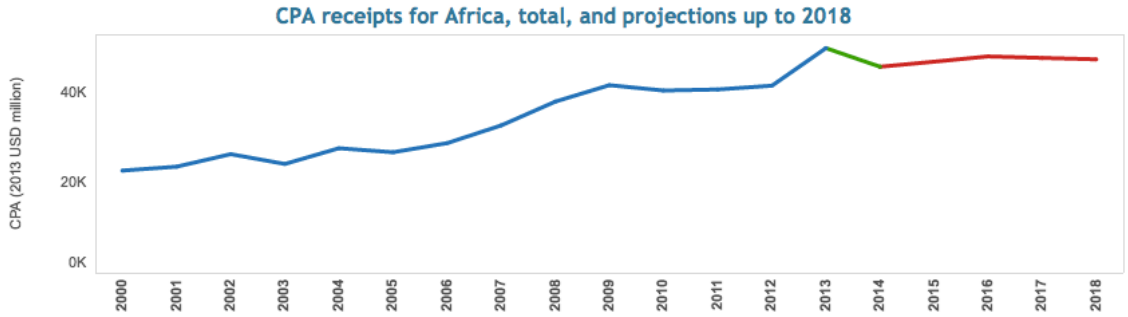


Figure 30: Country Programmable Aid receipts for Africa, total, and projections up to 2018 (OECD 2014a)

The geographical constraint for this case study is a broad one, encompassing all of Sub-Saharan Africa. This region has been suggested for a case study by respondents in the initial interviews due to its long and well-documented history with humanitarian work. Indeed, foreign aid has long been discussed in the context of Sub-Saharan Africa with differing viewpoints regarding its efficiency and effectiveness in creating real positive development (Levy 1988, Gomanee et al. 2002, Easterly 2003, Go and Page 2008, Uneze 2009). The region has been a considerable recipient of developmental aid for decades (OECD 2014b). The aid receipts for Africa since 2000 and the projection up to 2018 are summarised in Figure 30. While there have been numerous man-made and natural disasters in the region since 2000 ('Disaster Profiles' 2015), the focus is strictly on developmental humanitarian work to differentiate this case study from the other two, which focus on emergency responses.

The temporal constraint was chosen as a reflection of the Millennium Development Goals, which the respondents in the initial round of interviews highlighted as being key impulses for developmental humanitarian work. These eight goals were the antecedents of the current Sustainable Development Goals and were in force from 2000 until 2015. The Millennium Development Goals are (United Nations 2015):

1. To eradicate extreme poverty and hunger

2. To achieve universal primary education
3. To promote gender equality and empower women
4. To reduce child mortality
5. To improve maternal health
6. To combat HIV/AIDS, malaria, and other diseases
7. To ensure environmental sustainability
8. To develop a global partnership for development

These eight goals have a clear link to developmental humanitarian work, challenging in particular that it encompasses sustainability in economical, social, and environmental terms. With the final case study, HL in the context of developmental work in Sub-Saharan Africa will be analysed. While respondents have experience with humanitarian responses in various countries in Sub-Saharan Africa, the majority spoke about projects in the regions of Southern Africa and East Africa according to the map presented in Figure 31.

The Africa case study differs significantly from the Haiti and Pakistan case studies. Both its spatial and temporal boundaries are much broader and it does not focus on a particular disaster response. Within the Africa case study a variety of disasters are evident. These include, but are not limited to food crises such as the 2010 Sahel famine, the 2011 East Africa drought and armed conflict such as the Sudanese Civil War and the War in Somalia. The focus of this case study, in contrast to the other ones is on slow-onset disasters with a significant man-made contribution, whereas the Haiti and Pakistan case studies are centred around a specific disaster with a distinct natural trigger, even though in both cases man-made factors have exacerbated and complicated the disaster, resulting in a hybrid emergency.

The intention of the Africa case study is to illustrate a type of humanitarian SC that has a significantly different purpose from those in emergency response scenarios, the developmental humanitarian response. By its nature, developmental work has longer time horizons, which has resulted in the wider temporal boundaries for this case. Given the more permanent nature of many operations in this type of humanitarian response, SCs can be assumed to be less transient in nature, potentially allowing for elements of planning and standardisation that are more difficult to realise in the fast-moving emergency response environment. Many projects that interviewees for this case study have participated in are not directly allied to any particular disaster response, but form part of a wider, more fundamental commitment to development, whether that is economical development, education, nutrition, or health care. Fundamentally, however,

all of the operations represented still operate under a humanitarian mandate, which links them to those represented in the initial round of interviews and the emergency response case studies.

Given the wider geographical coverage, there is also a broader cultural variety represented in this case study, which has to be considered for the context particularly regarding the behavioural complexity elements of the conceptual framework. In the findings and subsequent analysis sections, care has been taken to focus on underlying themes rather than highly specific cultural nuances that were elaborated on as part of some interviews. Sociopolitical contexts vary considerably in the region covered in this broad case study. This is particularly relevant in areas affected by armed conflict and warfare, such as South Sudan and Somalia. There is an underlying commonality of political volatility and instability across much of the region. It is acknowledged that the Africa case encompasses a wider range of operations than the other two, with resultant larger variations in the environment and context influencing the HL component.

Figure 31: Five Regions of Africa (Exploring Africa 2016)

4.4.1 Introduction

Twelve interviews are part of the Developmental Humanitarian Response to Multiple Disasters in Sub-Saharan Africa from 2000 onwards case study (for the sake of simplicity called Africa case study from hereon). These interviews were conducted with individuals from nine different humanitarian organisations that are currently conducting developmental humanitarian responses in Sub-Saharan Africa or have done so since 2000. Five respondents represented small organisations, seven large ones. Both male and female participants were interviewed, working at headquarters of humanitarian organisations or in the field. Seven of them self-identified as logisticians. Table 30 summarises basic information about all participants in the Africa case study.

Table 30: Participant Characteristics in Africa case study

	Organisation Size	**Gender**	**Position**	**Job Description**
A1	Large	Female	Field	Other
A2	Large	Female	Field	Other
A3	Small	Male	Headquarters	Logistician
A4	Small	Male	Headquarters	Logistician
A5	Small	Female	Headquarters	Other
A6	Large	Male	Headquarters	Logistician
A7	Small	Male	Field	Other
A8	Large	Male	Field	Logistician
A9	Small	Female	Field	Other
A10	Large	Male	Headquarters	Logistician
A11	Large	Male	Headquarters	Logistician
A12	Large	Male	Headquarters	Logistician
SUMMARY	*5 small* *7 large*	*4 female* *8 male*	*7 headquarters* *5 field*	*7 logisticians* *5 other*

To protect their anonymity, informants are only identified by an alphanumerical code, where "A" stands for participation in the Africa case study and a number is assigned at random to each interview.

4.4.2 Complexity and Interdependency

As the central tenant of the framework for MSCs, *Complexity and Interdependency* combines aspects of both Dynamic Complexity and Behavioural Complexity. This aspect encompasses a variety of themes that deal with the network of interrelationships that characterise a wicked mess. From the NVivo analysis,

interviewees in the Africa case study discussed the themes summarised in Table 31 in relation to this aspect of the framework.

Table 31: Complexity and Interdependency

Bureaucracy	Hindered, delayed, and complicated HL
Local economy	Should be furthered and interacted with in a developmental context, which was a key concern for the humanitarian organisations
Global sourcing	Was frequently employed to meet quality, quantity, and cost targets.
Sustainability	Was a major concern and added operational complexity to the work of humanitarian organisations

Bureaucracy hinders, delays, and complicates HL in this case study (A6, A10, A11, A12). Respondents highlighted that this is particularly true for import regulations that are apparently regarded by countries as a measure of control and a sign of establishing a more sophisticated market as their nations continue to grow and develop (A6, A11, A12).

"More and more countries we used to see as developing countries are on their way to being developed and in that process they also implement regulations, import regulations." (A11)

It was stressed that this situation often persists, not just for developmental shipments, but also in the face of acute crises and emergencies. Out-dated, cumbersome regulations add complexity to HL. Organisations are often caught between delivering fast aid and respecting the sovereignty of the recipient nations.

"I don't know, exactly, the situation in the Ebola countries, but I'm pretty sure there are some countries now where everything goes very fast, but there are still countries that employ customs officers that have to put their stamps on it, that have to think about it so there it is still very cumbersome." (A11)

Frequent changes to regulations are particularly troublesome for humanitarian organisations (A6, A12). Compliance is necessary, particularly in developmental responses that require a longer-term attachment to a particular country, but it also ties up much-needed resources. Bureaucratic barriers keep many aid shipments from reaching beneficiaries in a timely manner.

"After running an operation via the port of Douala in a certain way last May, all of a sudden the authorities came back and said "oh, by the way, we have this legislation already for a couple of months, we've not yet enforced it, but we need every piece of paperwork that you now submit in original, stamped, and signed with blue ink; and by the way you have three or four containers in our port and that paperwork you have presented will have to be updated." And that was after they had been sitting on the paperwork for about six weeks. So, sometimes you have to deal with some of that. You learn, but the hard way." (A6).

In a developmental context, furthering and interacting with the ***local economy*** are key concerns for humanitarian organisations (A1, A3, A4, A5, A8). For developmental projects in particular, organisations can make a conscious choice to, instead of relying solely on large international suppliers to "*balance that also with support of local agriculture and economies as well, because potentially the amount of food we could buy could be a really big support to the local agricultural and economic system."* (A5). This is used particularly for the procurement of non-technical items in order to improve the impact a particular project has and feeds into sustainability and exit planning (A1). In most cases, organisations strive to "*be supplying finance into the country and the resources they need would be purchased within country."* (A4). Other organisations utilise contacts with local businesses as a direct source of donations from within the country they operate in, thus lessening dependency on international aid.

"In South Africa, we engaged with a hotel chain, it is one of the leading hotel chains in the country, they have... ah dozens of houses around the country. So before the world cup, you know the football world cup four years ago, they refitted all of their properties. All of them! So there was lots of surplus furniture. And even things like towels and beddings, just things they did not need any more, but we could use them. To make the best use of these things... we work with local businesses." (A3)

However, such sources of donations rely on the state of the local economy and may not necessarily be possible (A3, A10).

"We have a good local supplier there, construction company, so building supplies really, roofing, bricks, like that. But the problem here is that Uganda has a buoyant economy right now, so there is very little surplus, there is nothing there for us to use." (A3)

More generally, availability of products can be an issue, because the desired quality and quantity are not in supply within the country, thus making it impossible for organisations to support the local economy (A5, A6, A8).

To meet quality, quantity and cost targets, organisations tend to employ ***global sourcing*** policies (A1, A3, A5, A6, A8, A11). Despite efforts to support the local economy, the majority of sourcing, even for developmental humanitarian responses, takes place outside of the country in which a response occurs. A main reason for that is the lack of products of an acceptable quality locally (A1, A5, A11).

"In Liberia we're actually unable to purchase food locally in the right quantities, qualities and consistency throughout the year, so we import the food." (A5)

"It's not like [humanitarian organisation] is against local sourcing, but it really hasn't been all that successful for them. They do it, it's not like they don't do it at all. For certain items, technical things and like the ordinary day-to-day items, they source within the country. But there have been some really bad experiences with that... you know ordering a new truck and then the local log goes down to pick it up and that's the last we ever saw of the log or the truck... that's just not sustainable." (A8)

"That's a conviction that [humanitarian organisation] has that when we offer our services to our beneficiaries they should be of equivalent quality that we would acquire for ourselves, that we are used to. So that obviously ups the bar a bit and we all know the horror stories of what is out there in the third world, if you travel you see on the market heaps of pills in nice bright colours in bright sunlight that are supposedly antibiotics and that sort of stuff that obviously needs to be temperature controlled and shielded away from direct sunlight and so on. So since people get more sick from these types of things we just want to know, want to be in control of what we provide our patients. But it also means that we have much more international shipping and we then, also have to cross international boundaries and in more and more countries that is, I think, a real challenge." (A11)

However, an opposing view also exists, with some organisations sourcing globally because they regard products that are deemed to be of inferior quality in one part of the world as perfectly suitable for distribution in Sub-Saharan Africa.

"If you look at the UK, or the EU really, we have such high standards here for everything, which is good of course, but also harms things. A lot of goods will be rejected because they do not meet our high standards. They will be rejected and we can offer the companies an alternative. We take the goods right off their hands; essentially we provide a chain of custody from their door to the beneficiaries. It is developing another market where their rejected goods can go and even do some good. By giving us their surplus products, they protect their organisation. They have to take a hit

financially, but that's better than risking these products hitting the market and not being up to scratch, or even going to landfill." (A3)

From a SC point of view, centrally controlled sourcing can increase efficiency (A5, A10, A12). Organisations have the opportunity to build up a large supplier base, which they can utilise for price comparison (A1, A11). Furthermore, combining the demand patterns of several humanitarian projects can even out the ordering and thus make the buying behaviour more predictable (A5, A11, A12).

Sustainability of their work is a major concern and adds operational complexity for humanitarian organisations as these longer-term concerns need to be considered throughout the response, which necessitates significant planning and control (A1, A5, A11, A12). With the significant impact a developmental humanitarian mission can have on the local economy, an added level of complexity is the long-term impact the work has on the recipient country. Humanitarian organisations often directly work with and shape the practice of institutions like the national health service, the ministry of education or the ministry of agriculture (A1, A2, A5, A7, A12). With a longer time horizon that emergency responses, developmental work needs to rely even more heavily on a strong network of local connections (A1, A11) and has to consider the impact of their work in a much broader sense, as practices in the recipient nation might be altered irrevocably through the humanitarian intervention from abroad (A5, A12). There is also a stronger imperative to align with existing national priorities and targets.

"Both Liberia and Malawi do have school feedings on their national... not national curriculum... national strategy. They both have stated it as a desire that they do school feedings nationally [...] It is our desire, at some point that, like here, there is national school feeding for all children in all schools. Let's be realistic it's not going to happen any minute. But I think the Ministry of Education is Liberia is going to place one of their monitors in our programme, they'll fund it, so they can learn from what we're doing [...] So, ideally capacity building, sharing ideas, we're really open to that, we're not closed off." (A5)

Such capacity building is essential in the long term as organisations aim to scale back their programmes or exit a country entirely (A10, A12).

Within an organisation itself, there is an interdependency with other currently existing, as well as previously run, projects, for example in regards to shared purchases, or through sharing historical information and expertise from previous projects (A1, A10).

4.4.3 Non-Routine Operations

The aspect of *Non-Routine Operations* forms part of the Dynamic Complexity half of the conceptual framework for MSCs. Evidence of the influence this aspect has on HL was present in this case study. Key themes discussed by the interviewees are highlighted in Table 32.

Table 32: Non-Routine Operations

Project environment	That organisations worked in with relatively constrained timescales and mainly short-term targets, lacked continuity
Flexibility	Was required due to the unpredictable and frequently unstable operational environment
Remoteness	Of the developmental projects was a challenge for transport and SC management
Organisational learning	Was challenging, but could lead to an improvement of HL over time

Even in a developmental context, organisations are often working in a **project environment** with relatively constrained timescales and mainly short-term targets, thus lacking continuity (A1, A6, A9, A11). This is mainly due to the operational environment that changes quickly because of external influences such as politics. Even in longer-term developmental projects, a routine can be difficult to establish.

"It's unpredictable, the environment. Very unstable countries, politically, so that always changes and changes your supply chain." (A6)

These factors have an impact on HL as they complicate planning and preparedness (A1, A9, A11). The highly changeable project environment on the one hand is contrasted with long lead times for any external supplies that are required within the projects.

"It's very difficult to anticipate the needs in such a volatile environment. The long lead times are a very big problem." (A1)

Furthermore, there is a very high staff turnover within humanitarian organisations, particularly at the field level, as many staff members stay within a project only for a fixed time period, so there is little continuity even in long-established developmental projects that should theoretically be able to create more of a routine operating environment than emergency responses (A1, A2, A6, A11). Even when the situation on

the ground is changing little, there is constant turmoil within HL, a phenomenon that is not constrained to emergency responses.

"What you end up with is a project environment." (A6)

The need for ***flexibility*** is strong due to the unpredictable and frequently unstable operational environment (A1, A2, A6, A9, A11). However, this is often limited by the long lead times for supplies, which respondents state are at least six months in most cases (A1, A5, A8, A9). This requires a high level of autonomy from logisticians in the field, who *"need to be very driven and pretty flexible and very goal focused. In the commercial world you tend to be more focused on your score card and what your boss will think of you"* (A11). This extremely high need for flexibility is seen to defeat many commercial approaches to SC management and logistics leading to problems with the timely and cost-effective delivery of supplies and inventory management (A12).

"The system is very flexible to me, but with that it's also very frustrating. We do end up with a lot of overstock and/or expiration of drugs." (A2)

Standardisation is generally appreciated and pursued by respondents in this case study, as they acknowledge the positive effects it could have on the execution of HL (A8, A9, A11). However, the importance of local knowledge and expertise is also highlighted (A1, A2, A6).

"There are some generic formulas that tell you for example if you have 5,000 people in a refugee camp, you need x toilets. But everything has to be adapted to the local environment. Really, we do the planning in the individual projects. You only know what it's like when you are there." (A1)

"We had many manuals, but the trouble is that the context is so different every time, so you don't apply a lot of that." (A6)

Thus the need for flexibility in HL impedes the development of standards and routines, or requires that at the very least they are adapted considerably to each humanitarian response, or even each individual project.

Remoteness of the developmental projects is a challenge for transport and SC management (A5, A6, A7, A12). From a SC perspective, long distances to the areas in Sub-Saharan Africa in which developmental work takes place result in considerable lead times, as well as a security risk and high demands on the transport equipment and personnel (A5, A7, A12)

"We used to buy products from about 300 miles away and with the infrastructure you've got there that's a real challenge." (A7)

Furthermore, long and difficult transport has a negative effect on the environmental sustainability of HL (A12).

Demands on HL and humanitarian logisticians are much higher and encompass a much broader spectrum of skills than in their commercial counterparts (A1, A2, A7). The poor infrastructure, and the remoteness of locations in particular, makes it difficult to meet basic logistics requirements in this case study.

"Liberia is a much more challenging situation. Obviously, weather, bad road systems, keeping a fleet of vehicles in good condition all the time, schools being really remote, trying to just keep or getting the right quantities to the right schools at the right time [is a problem]." (A6)

These issues are scarcely present in most commercial SCs and call into question whether it is even possible to establish and manage SCs under such conditions, as *"you just don't have the roads and that's the end of your supply chain. If you don't have a road there's not much you can manage."* (A4).

Apart from physical remoteness, information remoteness is very challenging for organisations, especially for those working with centralised systems that rely on data input on a local level to function well (A12).

"In Somalia, I would say information management is our key problem. We don't have proper software; often we don't even have computers. It's even simple things. I'm not talking about SAP or anything fancy here, just normal things. But even to use excel, you need skills and those are just not there in the field." (A6)

Organisational learning that could lead to an improvement of HL over time is challenging (A1, A2, A8, A11, A12). This is mostly *"because there is little continuity in the projects, it's very important that data is collected somewhere so we can learn even when the staff don't have much experience."* (A1). There is a high staff turnover especially in the field personnel of humanitarian organisations and even long-term employees are often changing between projects after a few months, so *"there are a lot of people who are doing it for the first time and are learning in the field."* (A2). The creation of feedback loops is very strongly encouraged, but such processes take time away from the core humanitarian activities (A1, A12). In many ways logisticians *"form the memory of the project."* (A11).

Collaboration with partner organisations can facilitate learning as different areas of expertise are combined and there is a wider range of expertise available (A12). Standardised and centralised functions facilitate organisational learning better than localised ones (A11, A12). Conversely, it is often the local staff that stay the longest

within a particular project and thus provide the vital knowledge of operations on the ground that cannot be captured in such depth centrally (A2).

"Some people have been with them for ages, and it really shows, that learning just stays in the organisation and it helps so much. So that would be a big thing if we could get more of that, just learn from what has been done before." (A8)

4.4.4 No Clear and Quantifiable Specifications

The aspect of *No Clear and Quantifiable Specifications* represents the second part of the Dynamic Complexity half of the conceptual framework for MSCs. It relates to the difficulty of accurately comprehending and documenting messy or wicked problems. Comments from the participants fell into the following main categories summarised in Table 33.

Table 33: No Clear and Quantifiable Specifications

Needs assessment	Was essential immediately prior to a humanitarian response or in the early stages of one, thus determining the design of the SC
Learning from data	Presented a challenge for humanitarian organisations even where data could be collected
Tools adapted locally	To actually capture the complexity of interactions in a humanitarian SC
Financial situation	Could be positively impacted by better data management and learning from data in the logistics of humanitarian organisations

Needs assessment is essential immediately prior to a humanitarian response or in the early stages of one, thus determining the design of the SC (A1, A2, A4, A9). To gain an understanding of what is needed by the beneficiaries and what a particular humanitarian mission might aim to achieve, as well as the development of appropriate supply lines to satisfy these needs, information needs to be gathered at the very beginning of an operation (A1, A9). This task is performed by the field staff directly in the particular operational context.

"There is some agreed, uniformly tracked…. But I'm not aware of any detail. That would be down to the local staff, depending on the situation, especially in the area of relief and development." (A4)

Approaches to the initial needs assessment vary, but apart from some broad guidelines, the methods employed to arrive at estimates are often left up to the field staff (A1, A2, A10).

"We do make our estimations based on the target population, the government scene, us coming and those things are really done by the techs in the field and there are also a lot of people who are doing it for the first time [...] that is a very difficult assessment, which contributes to ending up with overstock or shortage." (A2)

This has drawn some criticism from respondents who see the issues associated with incorrect initial needs assessment and the consequences this has as SCs are developed based on false assumptions (A9, A12). As needs assessment is common across every humanitarian response, some interviewees call for a streamlined process.

"Sometimes you can streamline things and I believe it should be done more. We don't streamline very well as a sector." (A9)

Even where data can be collected, ***learning from data*** presents a challenge for humanitarian organisations (A2, A4, A5, A12). Learning is often not formalised, but occurs naturally as employees gather experience in the field (A2, A4, A9). However, due to the aforementioned high staff turnover in HL, such learning lacks continuity (A1, A2, A5).

"Because there is little continuity in the projects, it's very important that data is collected somewhere so we can learn even when the staff don't have much experience." (A1)

Several respondents advocate central data collection, but there is also a strong conviction that true learning can only take place in the local context (A1, A2, A4, A5, A12). Learning from data should not be confined to the humanitarian organisation, but has to involve beneficiaries as well (A2, A10, A12). On occasion, data from external sources, such as commissioning an agricultural feasibility study, has been found to produce better insights and more incentives for learning (A7, A12).

Any tools or guidelines need to be ***adapted locally*** to actually capture the complexity of interactions in a humanitarian SC (A1, A4, A5, A6). Organisations consider the political priorities within the countries they operate in, and also align their developmental work to larger agendas, such as the Millennium Goals (A5). Where standardised approached or guidelines exist, it is essential to adapt them to the particular local context for best effect, as humanitarian organisations acknowledge that the culture, politics, and general environment have a major impact on the approaches that can be utilised, as well as the outcomes they elicit (A1, A2, A4, A5, A12). Thus, the

involvement of local staff and beneficiaries is essential to make sense of data that is gathered in a project, and to adapt standard tools and guidelines.

"You have to know when you need outside expertise! It's important not to insist on doing everything alone. Most of the time, local knowledge is most important. We take every bit of information we gather back to the local communities, we talk everything over, really want all the different views and want to create that buy-in as well, for all their decisions. That's really important, need to create that feeling that we're all in it together." (A7)

Better data management and learning from data in their logistics could have a positive impact on the ***financial situation*** of humanitarian organisations (A1, A2, A5, A6). Shrinkage of inventory is a significant problem in many developmental projects causing considerable financial loss that often remains undetected as stock keeping is not accurate or timely (A1, A2, A6, A8).

"We try to record consumption at the source, so the pharmacy has a record of aggregate demand. It's not as accurate, because you don't know what has actually been used where, or what has been used and what has been stolen. So you might record a demand of 100, but only 50 were used for patients. So you continue to order 100 when you only need 50, but then again, if 50 were stolen, then you will continue to need 100." (A1)

The above quote highlights the difficulties of accurate data management, but also the consequences this has for SCs. As logistics account for a significant portion of the money spent in humanitarian work, logisticians often work closely with finance personnel (A1, A5, A6).

"The logistics programmes and finance functions all work together and feeding in the programmes would be the monitors who actually visit each school twice so that information comes from the field. So those three functions tie into each other [...] when we're setting the budget." (A5)

Appropriate information management is particularly important to support sourcing decisions, which make up a significant part of the budget (A1, A5, A12). Due to the long lead times of many supplies, forecasting needs to occur with reasonable accuracy to enable logisticians and other decision makers to make financially sound sourcing decisions (A2). Because of its significant impact on the financial situation of a humanitarian organisation, accuracy in HL is essential for the viability of the organisation and its success (A1).

4.4.5 Multitude of Diverse Stakeholder Views

Moving now into the Behavioural Complexity half of the conceptual framework, the next aspect to be discussed is the *Multitude of Diverse Stakeholder Views*. The participants in the Africa case study discussed these properties extensively and four main themes emerged in the course of the primary research as presented in Table 34.

Table 34: Multitude of Diverse Stakeholder Views

Continuity	In the involvement of both beneficiaries and donors was essential in developmental responses
Local Community	Involvement was essential to ensure that humanitarian work had the best impact possible
Cultural barriers	Were numerous in the developmental humanitarian work in this case study
Sustainability	As well as the preparation of a successful exit of the humanitarian organisation were major concerns

Continuity in the involvement of both beneficiaries and donors is essential in developmental responses (A3, A4, A7, A9). On the funding side of a humanitarian organisation, it is vital to maintain continuous funding outside of specific projects, as overhead costs need to be covered on an on-going basis (A9). Planning that is essential for the sustainability of developmental projects can only occur when there is some funding security (A6). The ways in which continuous funding can be achieved vary depending on the size and location of donors, and while some organisations find governmental donations to be the most predictable and steady, others advocate the value of small, continuous donations from a wide base of individual donors (A4, A7, A9). Continuity of donations in either case relies upon accurate information.

"It is always easiest to get money for something specific, but that's seldom how it works, we can hardly ever say that we have one specific thing, it will cost that much and this is when it will be done. Doesn't work that way. So we are trying to get people to commit to a direct debit every month. You know, £10 a month funds a farmer after a year and it's not that much for the donor." (A7)

However, the need for continuity is not limited to donors, but also concerns beneficiaries. Particularly in developmental humanitarian responses, reliability over a longer period of time is vital to secure the positive impact of a project (A3, A4, A5). This can only occur if local people are involved in the decision-making process on the

direction humanitarian work takes (A3). Many organisations have noticed a change in the needs as communities develop.

"The requests from the local communities there seem to have moved much more towards education and empowerment and even justice issues as well. I think we don't... we cannot just go on doing the same thing. The needs change, and for us, more importantly, the requests from the local community change." (A4)

Organisations have to work very closely with the ***local community*** to ensure that their work has the best impact possible (A3, A4, A5, A9).

"The local population needs to be seen as not just victims but as human beings that also have a lot to offer." (A9)

Interactions with this very important stakeholder group are essential to ensure programmes are run to the best of their ability and have the largest possible impact (A1, A3, A4, A7).

"The programmes are actually owned by local communities and schools; so in effect in partnership with the community [...] [humanitarian organisation] will provide the food and the training, the community supplies, in Malawi for example, the school feeding committee that provides volunteers for cooking and then the school will provide management of the programme and its use." (A5)

"All organisations probably highlight Northern Uganda as an example of a particularly vibrant community. There is so much happening there and so much support from the local people and it is stunning how much has been achieved there since I started working with the organisation. It's a good example of how aid can evolve into something more... it's all about involving local people. We do that through our local partners and their outreach programmes that really capture a lot of the community interaction and help us get a lot of feedback on how we do." (A3)

These quotes highlight the high potential of positive interactions with the local community in a developmental context. Especially as many areas of Sub-Saharan Africa have seen much long-term humanitarian aid, making sure it is spent in a manner that actually benefits the community is essential (A1, A7, A8). A lack of community engagement is associated with issues of corruption and money disappearing without any evidence of impactful change (A4, A12).

There are numerous ***cultural barriers*** in developmental humanitarian work in Sub-Saharan Africa (A7, A10, A12). These can manifest themselves in differences in very basic thinking patterns:

"The people we work with do not think linear, in that sort of cause and effect line." (A10)

Such differences can lead to difficulties in communicating with local stakeholders. In addition, channels of communication might differ from developed countries:

"In that region, the church is like the local newspaper. They do announcements before church. There is no media available, so that's really the only way to communicate with the entire community. Before the church service, they first announce the date so people know that and then they announce anything that is new. Through the church we also have a good network and can do a lot of the training locally." (A7)

It can be challenging to communicate certain expected standards to local partners, as *"they have no picture of what we are trying to do. There is no awareness of the sort of standards you would expect"* (A7). In terms of SC management, this can be particularly apparent in regards to ethical standards as the following quote illustrates:

"We may decide to apply the same requirements in term of ethics to all aspects of the supply chains we fund, which may be the same ethics we require of our staff. However, we know that attitudes on ethics are culturally specific, so what seems ethical to us may seem uncompetitive or unnecessary to a supplier, and therefore he may be less likely to implement the measures successfully or thoroughly." (A12)

Organisations want to employ people that display intercultural sensitivity and an ability to adapt to different working practices and communication strategies (A1, A10, A12). However, an interviewee also cautioned against overstating cultural differences:

"There is a lot of hiding behind the cultural differences. Of course they are there, but they should not be used as an excuse for everything. But we also need people that can work with that." (A7)

Sustainability of the humanitarian operations, as well as the preparation of a successful exit of the humanitarian organisation, are major concerns (A1, A3, A7, A9, A12). The challenge with developmental work as compared to emergency humanitarian responses is the longer time scale that calls for a more extensive development of the SC.

"If operations must be sustained for a longer period of time the supply chain progressively changes and becomes more structured" (A12)

For true sustainability to be achieved, organisations aim to engage the local community as much as possible and have an exit strategy that they are working towards, the aim being to leave a functioning community behind, which can sustain itself without

external help (A1, A7, A8, A12). To achieve this, capacity building is essential, transferring skills to local staff and beneficiaries (A7).

"The ultimate goal is the hand-over to the local population, so you start planning that early. That is also important in supplies. If you can procure something locally, you should because it will make the handover easier. You really always plan with the exit in mind." (A1)

"We have locally elected members on all of our committees that are involved in planning for the future of each project. That gives us a continuity and like sustainability of our work." (A3)

4.4.6 Sociopolitical Impact

Sociopolitical Impact forms the final aspect of MSCs according to the previously developed conceptual framework. It also falls within the realm of Behavioural Complexity and is therefore particularly closely linked to the *Multitude of Diverse Stakeholder Views* aspect introduced above. Main themes discussed are summarised in Table 35.

Table 35: Sociopolitical Impact

Host governments	Were even more prominently involved in and affecting the developmental humanitarian responses, necessitating an alignment with their priorities
Donor countries	And their political landscape significantly impacted the continuity of funding that is essential for developmental work
Neutrality	As a core humanitarian principle could be difficult to uphold amidst the realities of humanitarian responses
Shaping society	Was a major impact of developmental work

This section expands upon these four themes by summarising key points from the interviews and presenting quotes in support of these points, thus exploring the existence of this aspect of the MSC framework in HL.

Politics within the recipient country are even more prominent in developmental humanitarian responses where priorities of ***host governments*** and humanitarian organisation need to align (A1, A3, A4, A5, A9, A11). Many organisations interact directly with government departments and ensure that their projects are in line with

developmental plans set by the nation, thus respecting their sovereignty and the potential for alignment of efforts for a greater combined impact (A1, A2, A5, A7, A12).

The greatest level of impact is often seen on the local level, where interactions are most direct and personal:

"We make it a priority to have a good line of communication with local councillors, that's very important for our work." (A3)

Furthermore, in states where the central government is weak or does not control all parts of the territory, impact might be more reliably created on a local level because of the absence or ineffectiveness of central structures.

"In Malawi it's all different anyways. Parties don't matter in Malawi. It's all very tribal there, it's a completely different environment." (A7)

However, this adherence to local rules and regulations does not eliminate lobbying from the agenda of humanitarian organisations, as some see it as part of their remit to speak up for their beneficiaries and to ensure their needs are met better by the host government (A1). In addition, some organisations consciously avoid getting involved with host governments.

"We are not usually involved with government. Some of the countries [...] so much corruption. We tend to avoid that in favour of actually getting to the communities." (A4)

Politics within the ***donor countries*** play a major role in the continuity of funding that is essential for developmental work (A3, A5, A7, A10). Donors are regarded as a very influential stakeholder group, in particular governmental donors (A3, A4, A6). Some regard governmental donations as vital for their work and align their projects closely to political agendas, seeing opportunities for international development work in a coordinated fashion (A7, A12). Others completely oppose that notion (A1, A3, A10).

"Generally, I would say don't jump into bed with governments because the money they give can only be tied to certain projects." (A3)

Changing political structures in donor countries can be both an advantage or a disadvantage for humanitarian organisations, as priorities and preferences can change quickly, thus giving politics a large influence over funding (A7, A12).

In addition, an alignment with political agendas in order to receive governmental funding can result in strict control mechanisms and reporting structures being imposed upon the humanitarian organisations (A3, A12).

"There is also this drive for standards... the donors give guidelines. There is this top down accountability pressure. You have to meet the donor requirements." (A9)

"It is often the donors, the donors put us under a lot of pressure to be efficient, so you have to be able to report." (A6)

These can be seen as encouraging best practice and transparency (A12), but others see them as limiting and controlling and elect to abstain from such sources of funding for the benefit of their organisation while maintaining their own reporting structures independent of donor control (A1, A10).

Neutrality as a core humanitarian principle can be difficult to uphold amidst the realities of humanitarian responses (A1, A3, A7, A10). On the donor side, not aligning humanitarian work with political priorities can mean that organisations forgo governmental donations in part or entirely (A1, A3, A10). Such organisations strongly assert their neutrality and the necessity to be independent of government funding in order to ensure that they are able to react to the most pertinent crises and support those in the greatest need of assistance, rather than aligning themselves to any form of political agenda (A1, A3, A10). Neutrality can encompass more than merely politics, particularly for organisations with a strong religious background:

"Anything we do with humanitarian... it is irrespective of the faith of the people in that country." (A4)

Even organisations that work with governments on the recipient side sometimes distance themselves from political agendas in order to preserve their neutrality.

"We don't work with any political parties in the country that we work in. We do work with the party that happens to be in power at that moment in time [...] we work with them but we're not, in effect, connected to any political party or we don't align ourselves politically at all." (A5)

Developmental work plays a large role in ***shaping society*** within the recipient country (A2, A4, A7, A12). Strong interactions with local governmental or tribal structures can introduce new ideas and practices (A1, A3, A7). Developmental projects with their longer time horizon are particularly good at providing jobs for locals and ideally educating and thus building capacities within the recipient nation (A2). Developing expertise and specific skills to ensure that projects that have been initiated through humanitarian aid can continue to prosper and create a positive impact within their host communities is the basis of successful humanitarian work, which includes the development of SCs that support the local economy and create markets for local products (A4, A7). Ideally, developmental humanitarian responses elicit lasting societal change:

"Children who had no... it had never entered their head that they could be different from their parents... then put them into school and if you are around the school... their mind-set has changed, they talk about being a doctor or a dentist or a policeman. Some of them are already on their way to college or university. You know, the sad thing is that in that context, there is a... these people that are down at the bottom of society would be considered useless. So what is the point of educating their children? Their brains don't work properly. But then you put them into school and you discover some of the brightest kids you've ever seen. That is what we do and why we do it!" (A4)

4.4.7 Summary of the Africa Case Study

Section 4 of this chapter has provided a summary of the findings obtained from the eight interviews of the Developmental Humanitarian Response to Multiple Disasters in Sub-Saharan Africa from 2000 onwards case study. This corresponds to the Redescription stage of RRREI. Evidence of all five characteristics of MSCs was found within the data gathered as part of the case study on the Developmental Humanitarian Response to Multiple Disasters in Sub-Saharan Africa from 2000 onwards case study. Figure 32 summarises the key themes identified, offering a variety of dimensions of the five characteristics.

In contrast to the Haiti and Pakistan case studies, the Africa case study has a much broader temporal and spatial boundary. There is a wide variety of cultural, social, and political factors at play during the considerable time span and across the wide geographical spread in this case study. Furthermore, many different challenges are posed by the multitude of disasters encompassed in the humanitarian operations that form part of this case study. Examples given by interviewees serve to illustrate broader elements of the developmental humanitarian environment than in the other two case studies that have tighter boundaries. Therefore, an effort has been made to summarise these at a relatively high level of abstraction, highlighting the similarities expressed by interviewees operating across different situations and settings within Sub-Saharan Africa. This case study thus provides a counterpoint to the two emergency response case studies.

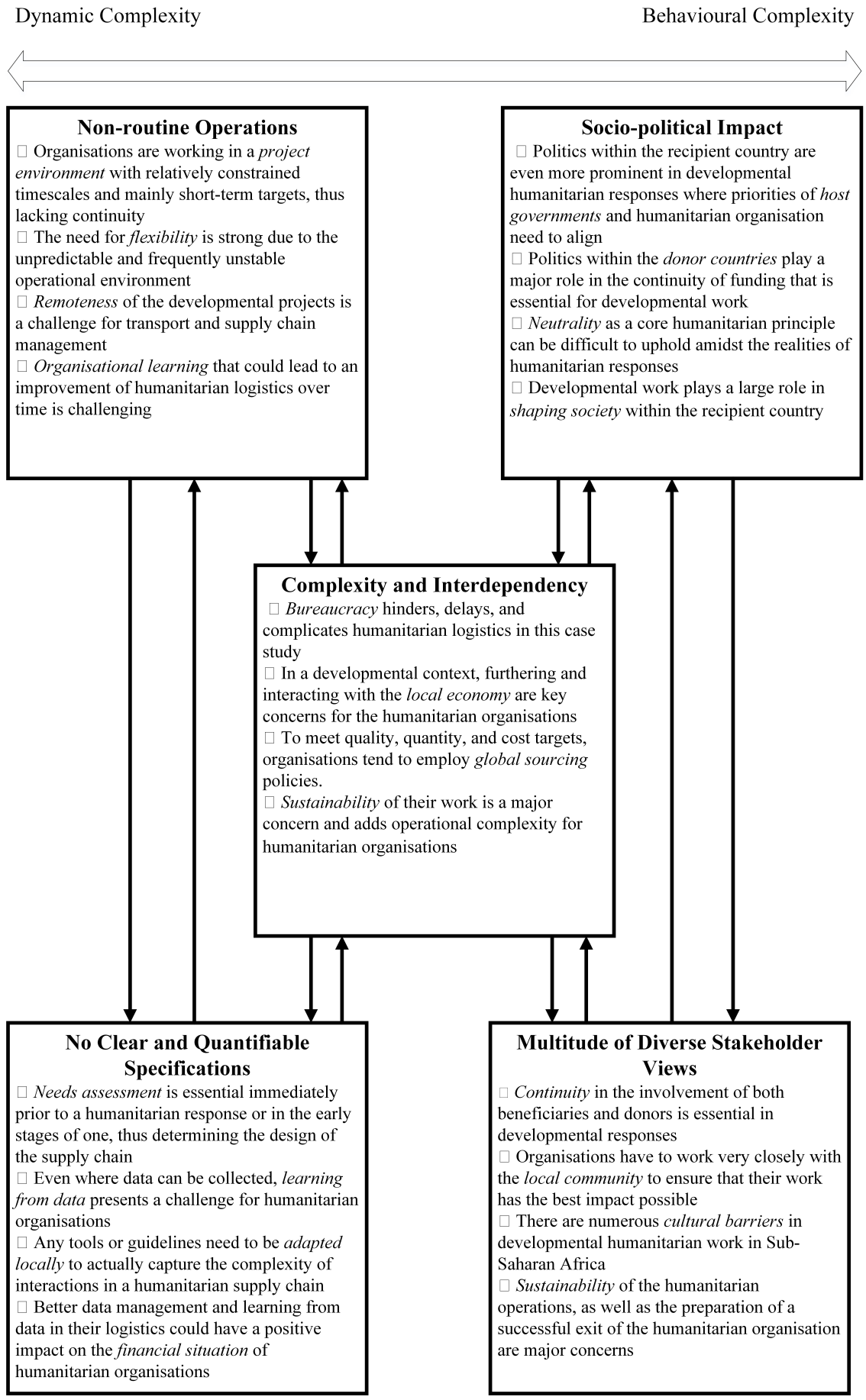


Figure 32: Summary of Findings from the Africa Case Study (author's own figure)

4.5 Summary

The overall aim of this thesis is to develop a conceptual framework for the management of non-standard SCs, based upon the concepts of wicked and messy problems and CAS, and to explore it in a HL context. In line with this main research aim, this chapter has reported the findings of the primary research conducted, which contributes to addressing Research Objective 3, carrying out empirical research to explore the proposed conceptual framework in the context of HL.

As detailed in Chapter 3, primary data was gathered through 44 semi-structured interviews consisting of an initial round of interviews and three case studies focusing on particular humanitarian responses as the unit of analysis. In this chapter, the findings were presented case by case, starting with the initial round of interviews and then reporting on two emergency humanitarian responses and one developmental humanitarian response as the three case studies that had emerged through a casing approached based upon information from the initial round of interviews. The findings from each case study were structured into the five aspects of the conceptual framework for MSCs that has been developed in Chapter 2. Through the extensive use of direct quotes for the data, the researcher has demonstrated a strong link with the primary research and the reader is able to appreciate the information upon which the subsequent discussion and analysis is based.

At the end of each section, an image of the conceptual framework was presented summarising the key themes that had emerged from the data for each of the aspects of the framework. It is apparent that the initial round of interviews, as well as each one of the three case studies, contain data that corresponds with each of the five aspects. However, the focus differs in each case study, particularly between the emergency responses and the more developmentally focussed case study on Sub-Saharan Africa. In the latter, integration with local markets, continuity, and sustainability are much larger concerns. In the Haiti case study, great international media attention and a wide range of different humanitarian organisations at the scene created particular challenges that contrasted with the Pakistan case study, which received significantly less international attention. Nevertheless, there are also multiple themes that reappear across the different cases. The cross-case analysis and discussion takes place in the subsequent chapter, where findings are contrasted between the individual case studies and put into the wider context of the literature. Eventually, conclusions will be drawn from the primary data that has been presented in detail in this chapter to eventually refine the proposed

conceptual framework based on the empirical research findings, thus addressing Research Objective 4.

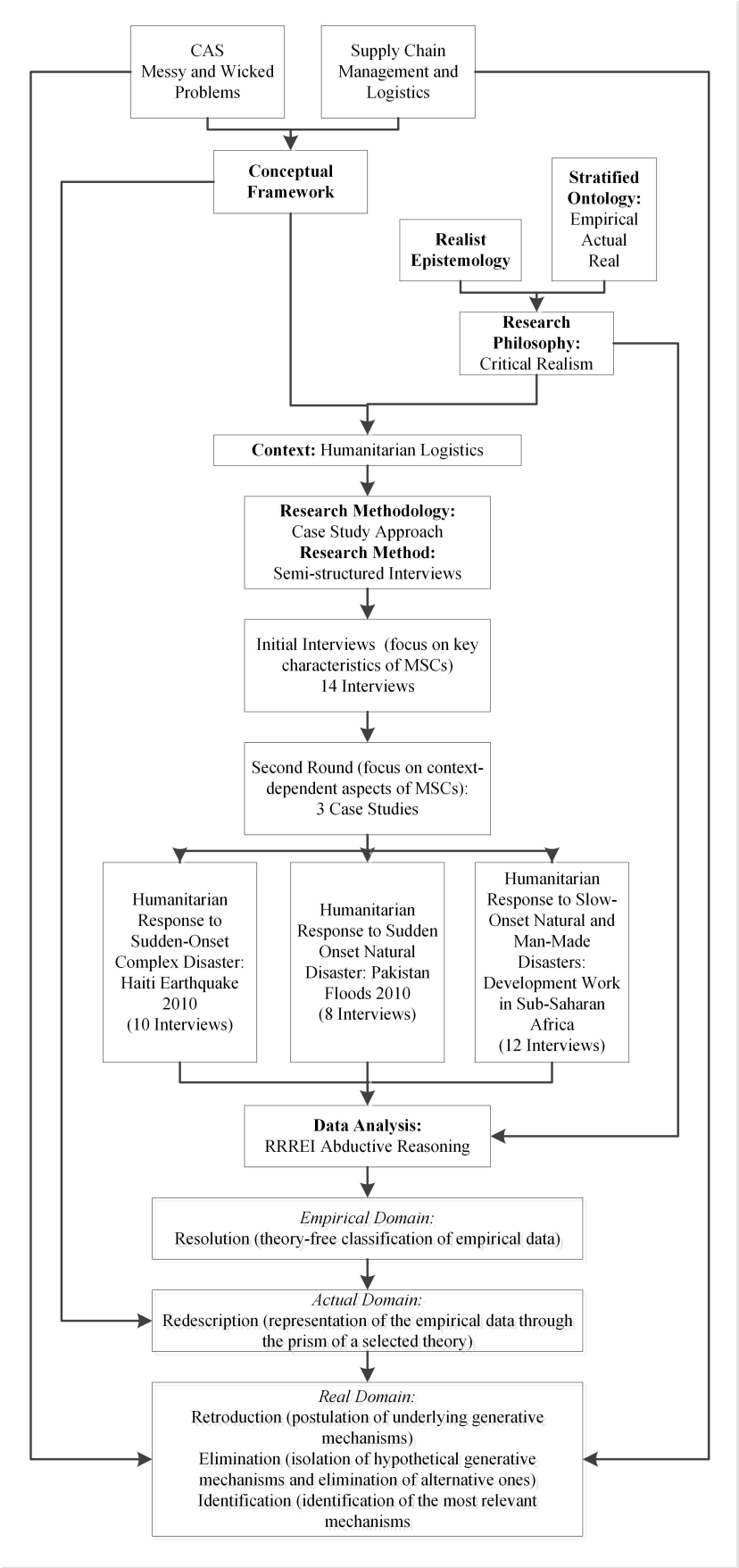


Figure 33: The Research Framework (author's own figure)

This chapter is predominantly descriptive, which forms an important part of the analysis of multiple case studies, as it allows the researcher to develop insights by identifying unique patterns within each case and gaining familiarity with their peculiarities (Eisenhardt 1989, Voss et al. 2002, Simons 2009, Yin 2009, Barratt et al. 2011). The cross-case analysis can be found in Chapter 5. This is in keeping with the suggestions of Yin (2014) who recommends that case study data is best presented by analysing each case separately before embarking upon the final analysis presenting results and overall contribution across the cases.

Following the research framework presented in Figure 33 and first introduced in Chapter 3, within the present chapter, *Redescription,* the second stage of RRREI occurs, representing the empirical data through the prism of CAS (Choi et al. 2001), “wicked" (Rittel and Webber 1973) or "messy" problems (Ackoff 1981). This theoretical lens serves to enhance the understanding of the factors that affect the applicability of standard management approaches and the outcomes they elicit, thus moving into the *Actual* domain of critical realism (Rotaru et al. 2014). *Retroduction, Elimination,* and *Identification* take place in Chapter 5, that is the postulation of underlying generative mechanism(s), isolation of hypothetical generative mechanism(s) and elimination of alternative one(s), and finally the identification of most relevant generative mechanisms (Rotaru et al. 2014). Within the reearch framework presented in Figure 33, the following chapter is going to move into the final stage, taking the research into the *Real* domain of critical realism.

5 Cross-Case Analysis and Discussion

Following on from the case-by-case analysis provided in Chapter 4, this chapter presents a cross-case analysis and discussion of its findings. In this step of the research process, overarching constructs are identified through a comparative study of the cases that represent different aspects of the overall context under investigation (Voss et al. 2002, Simons 2009). This is in keeping with the suggestions of Yin (2014) who recommends that subsequent to a separate analysis of each case, the researcher should provide a final analysis combining results in order to postulate an overall contribution of the study across the various cases.

While this chapter provides cross-case analysis and discussion, its aim is not to make direct comparisons between the cases. The two emergency responses, while both occurring in the same year, are vastly different in terms of the number of people affected, organisations involved, and geographical area affected, making a comparison difficult. Furthermore, the Africa case study has a much wider temporal and spatial boundary than the two emergency response case studies. The initial interviews are also included in this analysis and discussion as all four sets of interviews have provided valuable insights and examples of the broader context of HL, which is valuable in illustrating its complexities. There are significant differences between all of the case studies, as has been demonstrated through the thick description of the data in the previous chapter. However, all interviewees are involved in HL in its various forms and their experiences and quotes serve to illuminate the intricacies of behavioural and dynamic complexity in the context of HL.

The intention of this research is—in keeping with the qualitative approach employed—to focus on depth rather than breadth in studying a small number of cases intensively (Bryman 2012). Through a casing approach, a variety of cases has been developed following recommendations from interviewees in the initial round of interviews. This has resulted in three case studies that are all differently bounded. All three serve to illustrate different areas of humanitarian work, geographically, temporally, and culturally, but in all the underlying humanitarian principles that guide HL are the same. Rather than aiming for generalisability, transferability is the preferred way of evaluating qualitative research, recognising the contextual uniqueness and social network under observation (Lincoln and Guba 1985). The Africa case study is thus not seen as representative of all developmental humanitarian responses, just as the Haiti and Pakistan case studies are not sees as representative of all emergency humanitarian responses. The case studies are examples of such responses to explore the notions of

complexity within HL according to the research objectives of this thesis. Further work could be utilised to add further facets to this work, focussing on a broader range of humanitarian responses, both emergency and developmentally focussed.

Within the critical realist paradigm employed in this thesis, three ontological domains are recognised. So far, the *Empirical* and the *Actual* have been addressed through the work presented in Chapter 4, building upon empirical knowledge, events, and behaviours postulated therein. In the present chapter, the focus lies on the *Real* ontological domain, which is concerned with the generative mechanisms underlying events and behaviours in the *Actual* domain. As previously stated, critical realism denies the existence of an exclusive and absolute truth, and it is recognized that several explanations for a particular event or behaviour may exist (Sayer 2000, Hodgkinson and Starkey 2012). Work presented in this chapter aims to identify, through retroductive reasoning, generative mechanisms that could explain the existence of the particular empirical evidence (Mingers 2000a, Mingers 2006a). This thesis applies an abductive or retroductive mode of reasoning to link the three empirical (Danermark et al. 2002, Downward and Mearman 2007, Rotaru et al. 2014). While the data is presented through the lens of wicked and messy problems, the postulation of potential generative mechanisms extends beyond the existing theory (Rotaru et al. 2014).

As this thesis employs the RRREI method of logical abduction, three steps take place within the *Real* empirical domain reported upon in this chapter, namely *Retroduction, Elimination* and *Identification*. Table 36 below is included to remind the reader of the RRREI method and the different steps included in this chapter. Findings are presented and discussed according to the five elements of the proposed conceptual framework, which are postulated generic mechanisms as part of the *Retroduction* stage. The discussion in this chapter serves the dual purpose of *Elimination* of hypothetical generic mechanisms that could not be validated against the collected empirical data and *Identification* of the most relevant generative mechanisms. The discussion in this chapter is focussed on key aspects identified as being instrumental to causing the "messiness" of HL. The primary data is linked with evidence from HL literature.

Table 36: Application of critical realist RRREI method of logical abduction in this thesis (adapted from Rotaru et al. 2014)

CR Ontological Domains	Steps of CR's RRREI Abductive Reasoning	Logic of Research Discovery Adopted in this Thesis
EMPIRICAL (empirical knowledge)	**Resolution** (theory-free classification of empirical data)	Empirical data on structure and challenges of humanitarian responses collected through 44 semi-structured interviews with individuals involved in humanitarian responses as part of non-profit or governmental organisations
ACTUAL (all events and behaviours)	**Redescription** (representation of the empirical data through the prism of a selected theory)	Selection of CAS (Choi et al. 2001), "wicked" (Rittel and Webber 1973) or "messy" problems (Ackoff 1981) as a theoretical lens to enhance the understanding of the factors that affect the applicability of standard management approaches and the outcomes they elicit
REAL (generative mechanisms)	**Retroduction** (postulation of underlying generative mechanism(s))	Five underlying generative mechanisms form part of the proposed conceptual framework. From the primary, evidence for their existence is gathered, adapting the framework as necessary
	Elimination (isolation of hypothetical generative mechanism(s) and elimination of alternative one(s))	The relevance of the hypothetical generative mechanism is validated against the collected empirical data and research evidence from HL literature, all are found to be valid
	Identification (identification of most relevant generative mechanisms)	Differences in the weighting of the five generative mechanisms and the identified connections and interactions between them result in a revised conceptual framework

5.1 Complexity and Interdependency

Table 37 summarises the key themes that emerged from the three case studies and the initial interviews in the area of *Complexity and Interdependency*, which constitutes the central tenant of the MSC conceptual framework, amalgamating aspects of both *Dynamic Complexity* and *Behavioural Complexity.*

Table 37: Complexity and Interdependency — Cross-Case Analysis

Initial Interviews	**Africa Case**
• *Bureaucratic barriers* hinder the establishment of efficient and effective humanitarian logistics • *Collaboration and cooperation* with other agencies exists in the light of constant competition • The position of logistics within the organisational *hierarchy* and the interplay of decisions made at headquarters and in the field is an area of concern • The challenges of *preparedness* present an area of tension between donors, humanitarian organisations and potential recipients • Decisions regarding *sourcing* are the product of organisational beliefs as well as external factors	• *Bureaucracy* hinders, delays, and complicates humanitarian logistics in this case study • In a developmental context, furthering and interacting with the *local economy* are key concerns for the humanitarian organisations • To meet quality, quantity, and cost targets, organisations tend to employ *global sourcing* policies. • *Sustainability* of their work is a major concern and adds operational complexity for humanitarian organisations
Haiti Case	**Pakistan Case**
• Intense *competition for donations* occurred in this humanitarian response due to the scale of the international interest • *Duplication of efforts* posed a problem because of the large number of organisations in a fairly small disaster area • *Cooperation* with both non-profit and commercial organisations was identified as a solution, but also further source of complexity • *Local sourcing* in Haiti was severely constrained, but seen as desirable by respondents to support the local economy • Even though it was an emergency response, Haiti required *strategic direction* from the humanitarian organisations	• *Bureaucratic hurdles* significantly impeded the work of humanitarian logisticians • *Continuity and coordination of sourcing* proved to be particularly difficult as organisations struggled to move aid deliveries into the affected area • Coordination among agencies was necessary to avoid *duplication* but often proved unreliable and challenging • There was intense *competition between agencies* on both the donor and the beneficiary side of the humanitarian response

It is clearly apparent that similar themes were mentioned across multiple case studies, but some only occurred in a single section of the primary data analysis. The following discussion is connected to relevant literature, especially in the area of HL, thus highlighting links with previous work. The postulated generative mechanism under investigation here is that MSCs present complex, interdependent sets of problems that cannot be adequately addressed through reductionist approaches.

5.1.1 Key Themes Identified Relating to Complexity and Interdependency

The dichotomy between ***headquarters and field level*** operatives has only been raised as a concern regarding *Complexity and Interdependency* in the Initial Interviews; likewise, preparedness only features in that round of primary research. A lack of communications and trust between the different organisational levels has been addressed in literature previously (Oloruntoba and Gray 2006, Day et al. 2009, Tatham and Kovács 2010, Day 2014), but did not emerge as a theme in any of the three case studies. Similarly, the preparedness phase of humanitarian relief is a major concern for humanitarian logisticians with efforts concentrated on applying methods of pre-positioning and standardisation of supplies, but has not been raised amongst the key issues reported by respondents in this study outside of the initial interviews (Kovács and Spens 2009, Richey 2009, Tomasini and Van Wassenhove 2009, Rawls and Turnquist 2011, Kunz et al. 2014). This could be attributable to interviewees in the case studies being less involved in this phase. Pre-positioning adds a layer of complexity to HL as it links a variety of future responses with no or very limited information about the expected demand and thus demands significant efforts in advance planning (Day et al. 2012).

Sustainability was only a theme in the Africa case study, but not in the emergency response case studies. Previously, sustainability in HL has been linked to the importance of extensive stakeholder engagement (Kovács and Spens 2009), especially in developmental responses (McEntire 2004). Even though the respondents did not phrase it in terms of sustainability, the desire for strategic direction in the Haiti case study has similar connotations, expressing the need for longer-term concerns to feature even within an emergency response. Strategic planning has previously been highlighted as a critical success factor for humanitarian SCs (Pettit and Beresford 2009) in order to avoid the fire-fighting mentality prevalent in some emergency responses (Van Wassenhove 2006). In other subject areas, messy problems are known to have caused problems with strategic planning (McCool and Guthrie 2001, Lachapelle et al. 2003,

Camillus 2008). Within HL, it has previously been highlighted that there is not enough focus on research on the strategic planning phase of responses (Long 1997, Lettieri et al. 2009), however budgetary pressures on organisations have increased its importance within humanitarian organisations (Thomas and Kopczak 2005). This shift, that was acknowledged in older literature, has not been apparent within the primary research.

The ***duplication of efforts*** across humanitarian organisations and SCs was a concern in both emergency response case studies. In Haiti, this was attributed to the presence of a multitude of organisations in a geographically constrained affected area, but in the vast area in Pakistan, the same problem was recorded. In both cases, respondents noted the need for inter-organisational coordination of actions, but also pointed out that such efforts were challenging and often unreliable. In the literature, there is also evidence of duplication problems in developmental responses (Barr and Fafchamps 2006), but this was not raised by the respondents. As emergency response SCs emerge quickly after a disaster, communication and coordination are hampered (Day et al. 2012). This concern voiced by respondents is a direct result of the complexity of the system of HL, and links to the literature on SCs as CAS as emergent and constantly changing systems lacking control (Choi et al. 2001, Surana et al. 2005, Langdon and Sikora 2006, Pathak et al. 2007, Pathak et al. 2009). Inter-organisational efforts have been made in some environments to ensure that each of the large agencies specialises in a particular part of the humanitarian response to most effectively use resources and to build up a knowledgebase and experience while avoiding duplication (Kovács and Spens 2009, Day 2014).

Cooperation and coordination were identified as necessary to avoid duplication and as a solution to a multitude of problems by respondents in the Haiti and Pakistan case studies. However, it was also highlighted that such attempts engender further layers of complexity and a higher workload, which interviewees associated for example with the cluster approach. In the initial interviews, it was also highlighted that any cooperation or coordination exists in light of constant competition. Cooperation is an important part of SC management (Mentzer et al. 2001, Christopher 2005, Grant et al. 2006), but has proven difficult among humanitarian organisations (Long and Wood 1995, Oloruntoba and Gray 2009, Pettit and Beresford 2009, Tatham and Kovács 2010), and particularly with the military (Cross 2011, Seipel 2011, Heaslip et al. 2012). The difficulty of establishing connectivity amongst actors in the supply network aligns with discussions of CAS (Choi et al. 2001) as the supply network topology is shaped by the way in which actors interact (Day 2014).

The dichotomy of ***cooperation and competition*** inherent to CAS (Surana et al. 2005) is frequently addressed by interviewees. They highlight that all the constituent activities of HL occur with a strong awareness of constant competition. Respondents in the Haiti case study mentioned particularly intense competition due to the excessive international interest and media presence. In contrast, respondents in the Pakistan case study stressed the competition on both the donor and the beneficiary side of their SCs. The increasing and often highly politicized competition between humanitarian organisations is well documented in the literature (Bilodeau and Slivinski 1997, Van Wassenhove 2006, Beamon and Balcik 2008, Oloruntoba and Gray 2009, Everett and Friesen 2010). In terms of CAS, competition in HL serves to create emergent and highly dynamic realities (Choi et al. 2001). This is particularly poignant as organisations do not merely compete for resources, but also for beneficiaries and such competition drives constant change, thus resulting in increased managerial difficulties in HL as levels of connectivity vary. The interaction between cooperation and competition has emerged as a defining feature of HL through the primary research; a dichotomy commonly expressed by supply networks described as CAS.

Bureaucracy emerged as a key component of *Complexity and Interdependency* in all but the Haiti case study. It has been highlighted by respondents that bureaucracy links the humanitarian organisation to a wide variety of national and international bodies with a range of different requests and requirements. Such linkages are seen to hinder the efficiency and effectiveness of operations because they inhibit normal SC procedures in this context, tending to delay and complicate far beyond levels that are felt to exist in commercial logistics operations. Conversely, the complexity and large number of organisations involved in HL also serve to create additional layers of bureaucracy. In terms of CAS, this affects the resilience of the system (Pathak et al. 2007, Pathak et al. 2009, Day 2014), and the development of shorter paths (Strogatz 2001) and higher levels of path redundancy (Albert 2005) should be encouraged to reduce the amount and length of bureaucratic delays. The high levels of bureaucracy can be interpreted as a symptom of the decentralised control properties of a complex supply network, particularly one with as many diverse participants (Surana et al. 2005).

The only component of *Complexity and Interdependency* that was mentioned in all three of the case studies, as well as the initial round of interviews, was ***sourcing***. While it was generally agreed that local sourcing is desirable, principally for reasons of sustainability, interviewees highlighted that sourcing decisions are products of organisational beliefs and external factors. Especially in the emergency responses, local

availability was severely curtailed. While considerations of quality, quantity and cost make global sourcing desirable; respondents acknowledge that continuity and coordination of sourcing are major sources of complexity in HL. The dichotomy between and coexistence of local and international sourcing is congruent with a previous survey of humanitarian organisations that found that the decision making process is mostly dependent on the types of goods required (Blecken 2010), which was also a point several interviewees made in the present study. Concerns about information flows that enable successful sourcing, but can prove difficult in humanitarian SCs, a common theme in literature (Long and Wood 1995, Day et al. 2009, Blecken 2010), were also voiced. The information requirement can also be tied to the broader issue of pre-planning and possibly pre-positioning of supplies in earlier phases of the disaster response cycle (Ghanmi and Shaw 2008, Salmeron and Apte 2010, Lodree 2011, Rawls and Turnquist 2011, Bozkurt and Duran 2012, Galindo and Batta 2013, Kunz et al. 2014). In terms of CAS, the sourcing decisions have a major impact on the flexibility of a supply network (Pathak et al. 2007), which is of particular relevance in HL, a highly responsive SC context with a high level of emergence and associated necessity for facilitating highly dynamic supplier connections (Day et al. 2012, Day 2014).

5.1.2 Elimination and Identification of the Generative Mechanism Relating to Complexity and Interdependency

As corroborated by the extensive discussion of diverse themes above, evidence of factors contributing to the proposed generative mechanism has been uncovered in the empirical data collected, as well as across the HL literature. MSCs within HL, as captured by the case studies, can be understood to present complex, interdependent sets of problems that cannot be adequately addressed through reductionist approaches. Key themes identified incorporated:

- A high level of emergence within the SC necessitates highly dynamic supplier connections that complicate sourcing within the HL system, resulting in constant adaptation.
- Complex bureaucratic structures interact with various individual entities, displaying symptoms of the decentralised control properties of the system.
- A network of interactions of cooperation and competition among entities within the HL system contributes to the creation of emergent and highly dynamic system characteristics.

- Establishing interactions among actors to avoid duplication of efforts and to facilitate cooperation and coordination is difficult as there is no central element of control inherent to the HL system.

The underlying generative mechanism of *Complexity and Interdependency* is furthermore linked to all of the other four proposed generative mechanisms.

5.2 Non-Routine Operations

Table 38 summarises the key themes that emerged from the three case studies and the initial interviews in the area of *Non-routine Operations*, which forms part of the *Dynamic Complexity* half of the proposed MSC conceptual framework. Respondents associated a number of themes with *Non-routine Operations*, some repeated across the various sets of interviews while others remained singular to one particular response among the case studies represented here. However, similar, supplementary concerns in relation to the non-routine nature of humanitarian operations were voiced in several instances resulting in an amalgamation of related themes in the discussion presented here. The postulated generative mechanism under investigation here is that MSCs are non-routine operations, characterised by high uncertainty conditions necessitating flexibility

Table 38: Non-Routine Operations — Cross-Case Analysis

Initial Interviews	Africa Case
• The lack of *infrastructure* or the destruction of it due to disasters complicates humanitarian operations • Organisations are working in a *project environment* with relatively constrained timescales and mainly short-term targets • The need for *flexibility* is strong in unpredictable and frequently unstable situations that form the operational environment of humanitarian logistics • A *routine* needs to be developed and standard procedure followed to increase the efficiency of humanitarian logistics • *Organisational learning* that could lead to an improvement of humanitarian logistics over time is challenging	• Organisations are working in a *project environment* with relatively constrained timescales and mainly short-term targets, thus lacking continuity • The need for *flexibility* is strong due to the unpredictable and frequently unstable operational environment • *Remoteness* of the developmental projects is a challenge for transport and supply chain management • *Organisational learning* that could lead to an improvement of humanitarian logistics over time is challenging
Haiti Case	**Pakistan Case**
• The lack of *infrastructure* or the destruction of it due to the earthquake complicated humanitarian operations • The extensive destruction or general lack of *societal structures* further hindered humanitarian operations in Haiti, with interactions with the remaining governmental structures posing a specific challenge • A particular complicating factor was the significant *uncertainty* in this disaster response that inhibited the development of routines • The poor image of *supply chain management* inhibited learning and development	• The lack of *transport infrastructure* in the area affected by the floods complicated humanitarian operations • *Security concerns* slowed down the humanitarian response in this particular disaster • A particular complicating factor was the significant *uncertainty* in this disaster response that inhibited the development of routines • Problems with logistics were very pertinent in this response and resulted in a higher *awareness of logistics* in general, as well as the necessity of improvements in particular

5.2.1 Key Themes Identified Relating to Non-Routine Operations

Possibly the most apparent reason for *Non-routine Operations* in HL for the external observer is the destruction of ***infrastructure*** that inhibits many traditional logistics and SC approaches. In literature, its influence on the information flow, as well

as the physical flow of goods has been widely discussed (Thomas and Kopczak 2005, Altay et al. 2009, Maon et al. 2009, Holguín-Veras et al. 2012a, Holguín-Veras et al. 2012b). The lack of infrastructure was indeed mentioned as a complicating factor in the initial interviews, but as was pointed out in the two emergency response case studies, the real problem is not destruction of infrastructure due to the respective disasters, but a general lack in the regions the organisations operated in, even prior to the disaster. This was echoed by respondents in the Africa case study who highlighted the remoteness as a challenge for transport and SC management rather than a destruction of infrastructure. All respondents agreed that dealing with the destruction or lack of infrastructure was a routine part of their job.

There is an acknowledgement that ***routines*** need to be developed and standard procedures should be followed to ensure more effective and efficient HL operations, particularly in the initial round of interviews. This echoes commercial logistics and SC practices, but also has been mentioned in HL literature, predominantly because of a pressure from donors and other external stakeholders (Thomas and Kopczak 2005, Blecken 2010, Everett and Friesen 2010, Holguín-Veras et al. 2012a). As the respondents in the initial interviews had generally contributed to a wider variety of humanitarian responses, and thus had more opportunities to reflect on a variety of scenarios, they were more concerned with the big picture and the development of standards.

Conversely, the two emergency response case studies were dominated by the concerns over ***uncertainty*** and the changeability of the problem situations, which inhibit the development of routines and are seen as a significant complication to the operations. This highlights the big difference between the operational environment of emergency responses and developmental HL. The latter have a significantly higher potential for the development of routines, but even in the highly changeable environment of an emergency response, the value of routines is acknowledged and these are pursued where possible in order to improve HL performance. The differences between the two types of responses are evident throughout the primary data, particularly in the *Non-routine Operations* aspects. While respondents throughout recognised the desirability of routines, the difficulties highlighted were clearly split between emergency and developmental responses, with the initial interviews leaning towards the developmental response side of the replies.

Although developmental responses seem more settled and standardised, respondents highlighted the strong need for ***flexibility*** dictated by the unpredictable and

unstable operational environment. This has been highlighted as a challenge in HL before (Beamon and Balcik 2008, Chandes and Pache 2010), although most frequently in emergency responses. Humanitarian SCs are known to be particularly agile to shorten response times in sudden-onset disaster, but it is also acknowledged that a lean SC can provide cost effective relief in slow-onset disasters (Oloruntoba and Gray 2006, Charles et al. 2010). The prevalent concern with flexibility found in the primary data demonstrates that non-routine conditions inhibit the development of lean operations, even where it is acknowledged that they would be beneficial.

The extensive need for flexibility and responsiveness ties into a concern that even developmental humanitarian responses operate in a ***project environment***, with a distinct lack of continuity reflected in a focus on short-term targets and narrow time scales that inhibit the development of long-term solutions and efficiencies. The planning horizon is typically severely constrained with priority being given to quick fixes rather than overall optimisation, according to respondents in the Africa case study and the initial interviews. This lack of planning has previously been a theme in academic literature (Thomas and Mizushima 2005, Altay et al. 2009, Maon et al. 2009, Blecken 2010, Walton et al. 2011). Indeed, planning is gaining increased importance as researchers and practitioners realise the potential for improvements through actions such as pre-positioning of supplies and the ability to react more quickly (Chandes and Pache 2010, Overstreet et al. 2011). With increasing pressure on budgets, the need for strategic planning is becoming ever more apparent, elevating strategic planning to a critical success factor in HL (Thomas and Kopczak 2005, Pettit and Beresford 2009). The project environment described by interviewees serves to inhibit such efforts, thus adding to the messiness of HL.

Further evidence of *Non-routine Operations* in developmental humanitarian responses is given by the difficulties encountered by efforts to initiate ***organisational learning***. While respondents clearly recognised its inherent potential for organisational improvement, it was commonly described as challenging to learn from previous work, because of high staff turnover, as well as the widely differing operational environment, echoing concerns voiced regarding standardisation of procedures. Given the central role of logistics and SC management in humanitarian operations, gaining and learning from data in HL is crucial to overall learning and improvement (Thomas and Kopczak 2005, Van Wassenhove 2006, Apte 2009). Nevertheless, a distinct lack of wider performance measurements that might enable a more holistic understanding and thus facilitate learning, has been noted previously (Davidson 2007, Beamon and Balcik 2008, Van der

Laan et al. 2009, Schiffling and Piecyk 2014). This lack of learning serves to keep HL a non-routine operation.

In the emergency response case studies on Haiti and Pakistan, the issues raised in relation to the non-routine nature of HL operations differed from those mentioned by respondents from more developmentally oriented contexts.

The ***poor image*** of logistics and SC management within the humanitarian organisations was highlighted as a particular concern seen to inhibit learning, as well as the development of routines. HL is regarded as an area that mainly creates problems rather than solving them. In the extant literature, this lack of regard for HL has been linked to a dearth of professionalism (Walker 2004, Auton 2006, Kovács et al. 2012), and an exclusion from strategic planning (Van Wassenhove 2006, Pettit and Beresford 2009). The low recognition of the contribution of logistics is seen as a contributing factor to suboptimal performance, suppressing the benefit an organisation can gain from it (Gustavsson 2003, Thomas 2004, Kovács and Spens 2009). The primary data supports previous statements according to which the image of logistics is better within larger organisations (Thomas and Kopczak 2005). The lack of recognition can impede a move towards higher efficiency, better preparedness and improved accountability within humanitarian organisations (Tomasini and Van Wassenhove 2009, Moore and Taylor 2011). Not being included in planning and wider strategic considerations exacerbates previously acknowledged concerns in this section, thus contributing significantly to the maintenance of the non-routine nature of operations.

In addition to the previously mentioned infrastructural issues, ***societal concerns*** contributed significantly to the non-routine operations of HL according to the interviewees. In Haiti, a breakdown, or in some cases complete elimination of governmental and social structures made operations very challenging, as there were very few local contacts remaining in the country. In Pakistan, societal issues manifested in significant security concerns that were felt to slow down the response. Societal breakdown is a feature given less consideration in the literature compared to infrastructural issues, but it was regarded by respondents to be a pertinent issue. Further societal aspects will be discussed later in as far as they relate to sociopolitical issues or stakeholders, but it is worth noting that society as a whole also represents part of the infrastructure commonly assumed to be in place in order for logistics and SCs to function, but might not be a given in a humanitarian context. Even though *Non-routine Operations* form part of the *Dynamic Complexity* half of the conceptual framework, social and behavioural aspects are incorporated here in as far as they pertain to the

development of or lack of routines. Faced with a changing and often impossible to decipher network of complex social connections, especially when these have been disrupted by a disaster, HL clearly operates in a non-routine environment.

5.2.2 Elimination and Identification of the Generative Mechanism Relating to Non-Routine Operations

The above discussion has provided confirmation for the validity of the existence of evidence for the proposed generative mechanism in the empirical data collected, as well as well as resonating in the extant literature. MSCs within HL, as captured by the case studies, can be regarded as non-routine operations, characterised by high uncertainty conditions necessitating flexibility. Key themes identified incorporated:

- High uncertainty and constantly emergent properties result in a strong need for flexibility within the system, inhibiting the development of routines as the system constantly evolves.
- Operations occur within a project environment with an acute lack of continuity and formalised organisational learning, as the system adapts and evolves dynamically.
- A lack of recognition of HL results in a severe lack of centralised control, rather exhibiting signs of complex personal interactions that shape the system as a whole.
- Both infrastructural and societal challenges create an emergent and highly dynamic operational environment that forces the system to constantly adapt.
- The underlying generative mechanism of *Non-Routine Operations* is furthermore linked to other proposed generative mechanisms. *Complexity and Interdependency* forms the background to it. Particularly strong links exist with *No Clear and Quantifiable Specifications* and *Multitude of Diverse Stakeholder Views.*

5.3 No Clear and Quantifiable Specifications

The themes emerging from the three case studies and the initial round of interviews related to the area of *No Clear and Quantifiable Specifications* are summarised in Table 39. This forms the second part of the *Dynamic Complexity* half of the proposed MSC conceptual framework. Several themes are pertinent across all of the case studies, while others are more stand-alone. The findings from primary data are

amalgamated here and are discussed in connection with relevant literature, putting the findings into a wider context of academic and practitioner thought. There is evidence of this aspect of the framework across the case studies and the initial interviews. Contrary to the previous section, no distinctive differences between emergency and developmental humanitarian responses emerged, with similar issues shared across both types. The postulated generative mechanism under investigation here is that MSCs exhibit a lack of optimal solutions derived from quantifiable evaluation, as there are no clear and quantifiable specifications.

Table 39: No Clear and Quantifiable Specifications — Cross-Case Analysis

Initial Interviews	Africa Case
• *Needs assessment* is essential immediately prior to a humanitarian response or in the early stages of one, thus determining the design of the supply chain • Gathering data on a *local level* as required for the development of efficient and effective supply chains is challenging • *Forecasting demand* within a humanitarian response with sufficient accuracy to enable logistics planning is difficult • *Data needs and availability* at different hierarchical and organisational levels within a humanitarian organisation are diverse • *The use of technology* facilitates data gathering and information management to plan, execute and develop humanitarian logistics	• *Needs assessment* is essential immediately prior to a humanitarian response or in the early stages of one, thus determining the design of the supply chain • While data is generally available or can be collected, *learning from data* presents a challenge for humanitarian organisations • Any tools or guidelines need to be *adapted locally* to actually capture the complexity of interactions in a humanitarian supply chain • Better data management and learning from data in their logistics could have a positive impact on the *financial situation* of humanitarian organisations
Haiti Case	**Pakistan Case**
• Organisations struggled to assess the situation accurately because the only information they have is *out-dated* • The use of actual, accurate data has a very positive impact on *supply chain performance* in the humanitarian response • Respondents were keen to engage with *new sources of information* such as academic consultants and social media • The use of *information technology* to enable a better understanding and management of humanitarian logistics is being pioneered	• *Impact assessment* proved to be almost impossible, while organisations are able to measure input and output, the actual impact of their work remains unknown • *Accurate record keeping* is too time intensive in a humanitarian response even when an awareness of its importance exists • *Stock keeping* represents a major financial concern for humanitarian organisations in disaster responses such as Pakistan • *Local knowledge* is of vital importance in coordinating and instigating a humanitarian response and provides the best source of information

5.3.1 Key Themes Identified Relating to No Clear and Quantifiable Specifications

Respondents in all settings raised ***data availability*** as a key concern inhibiting the development of an accurate understanding, much less a quantification of HL issues.

Particular problems pointed out by interviewees included the differing data needs between various hierarchical levels or parts of the organisation, as well as a lack of accuracy and timeliness. In the Africa case study, it was acknowledged that data can be collected, but there is little learning from it, whereas respondents in the emergency responses voiced more concerns about collecting data in the first place. Problems with information availability, as well as the distribution of available information have previously been discussed in the literature (Day et al. 2009, Bharosa et al. 2010, Tatham and Spens 2011). These are particularly pertinent where clear information is required to be passed on to external stakeholders, such as donors or suppliers (Long and Wood 1995, Blecken 2010, Hellingrath and Widera 2011). These concerns are tied to previously discussed issues, such as the lack of infrastructure, which also extends to ways of transmitting and recording information (Thomas and Kopczak 2005), and the high levels of uncertainty experienced due to a lack of understanding of the problem situation (Tomasini and Van Wassenhove 2009, Day et al. 2012). This demonstrates the *Complexity and Interdependency* stipulated as the central tenet of MSCs.

A particular concern related to the availability of suitable data is the ***initial needs assessment***, which was highlighted by respondents in the initial interviews and in the Africa case study. This action in an early phase of a humanitarian response is essential to determine the design of the SC as amounts and types of goods needed are assessed, as well as considerations on local versus global sourcing. For the initial response, the SC needs to quickly have the best data available on the disaster area, affected population and prospective needs (Blecken 2010). It is curious that needs assessment does not feature in the data collected on the emergency responses. However, this can be explained by a greater reliance on pre-packaged kits and pre-positioned supplies for those responses, practices that were also detailed by the respondents. Because the initial needs assessment is seen as difficult and time-consuming, it is partially forgone in the initial disaster response in favour of more standardised solutions that have been shown to yield satisfactory results in meeting immediate needs. Needs assessment still takes place, but it is likely to be more perfunctory. This is due to the need for a fast response that overrules the focus on setting up a SC based on as much data as can be included in designing the somewhat more stable SC for developmental projects. While needs assessment is an on-going process throughout any humanitarian response (Thomas and Kopczak 2005, Blecken 2010), it did not feature strongly as an issue in the two emergency case studies.

Conversely, ***impact assessment*** featured as a topic in the Pakistan case study. Respondents highlighted that while organisations are able to measure input and output, there is no true understanding of the actual impact of their work. This hints at a wider issue in performance measurement in HL (Beamon and Balcik 2008, Tatham and Pettit 2010, Schiffling and Piecyk 2014, D'Haene et al. 2015) as well as non-profit operations in general (Drucker 1990, Buckmaster 1999, Sawhill and Williamson 2001), where performance measurement rarely considers the outcomes achieved by the operations, such as an improved situation for the beneficiaries. The lack of adequate impact assessment contributes to an incomplete understanding of what the SC ultimately achieves.

Forecasting is also a struggle according to respondents, as information is quickly out-dated, particularly in emergency responses. This matches observations in existing literature that establish that it is very difficult to design a SC in a rapidly changing market place according to forecasts, as there is a very limited time frame available to collect information (Pettit and Beresford 2005, Tatham and Kovács 2007, Kovács and Spens 2009). The aforementioned difficulties with planning in HL tie directly into the inability to forecast demand within a humanitarian response with sufficient accuracy, as has been highlighted by the respondents in this study (Altay et al. 2009, Maon et al. 2009, Banomyong and Sopadang 2010, Ben-Tal et al. 2011, Bozorgi-Amiri et al. 2013). The lack of adequate forecasting results in an inability to comprehend the situations faced by SCs, and thus leads to difficulties in applying standard management techniques that would be used in comparative SC scenarios outside of a humanitarian environment. The difficulty to quantify and capture problems with standard management techniques is an important feature highlighted in literature on wicked and messy problems (Wagner 1995, Lyles 2014).

Across all three case studies, there was a distinctive awareness of the impact that the lack of clear specifications, quantifiable where possible, has on ***SC performance*** and the overall financial performance of humanitarian organisations. Respondents felt that better data management, data accuracy and timeliness, and learning based upon that data would enhance performance and make HL more financially sustainable. In particular, accurate stock keeping was highlighted as a key area of concern. Given the significant proportion of cost incurred by the SC of humanitarian organisations, stock keeping has a major impact upon financial performance. While organisations have different approaches to financial management, increasing donor scrutiny means that finances are generally managed very tightly (Schulz and Heigh 2009, de Leeuw 2010,

Abidi et al. 2013). The messy characteristics of HL, in particular the lack of clear, quantifiable specifications, are seen to be diminishing overall organisational performance and have a negative impact upon the financial sustainability of the operations.

The increased use of ***information technology*** is currently being pioneered in order to gather and manage information to plan, execute and develop HL, according to respondents in the initial interviews, as well as the Haiti and the Africa case studies. It is noticeable that the use of technological tools applies to each step of the data management process from collection to dissemination. In commercial operations, technology made it possible to integrate logistics functions and handle more complex processes even across company boundaries (Bowersox and Closs 1996, Chen and Paulraj 2004), but the improvements that technology has brought to commercial SCs, are only slowly arriving at humanitarian organisations, because of a lack of knowledge about data needs, the reluctance of donors to finance technology without an immediate benefit, and the resulting lack of capital (Gustavsson 2003). Suitable technology for this particular operational environment is gaining traction (Kovács 2011). Especially in smaller organisations, respondents also highlighted the creative use of standard technology for their needs, such as social media utilised as a source of real-time information gathering for initial needs assessment and updates on the situation on the ground, particularly in highly changeable environments.

The most significant way in which this particular aspect of messiness in HL is being managed according to respondents is the use of extensive ***local knowledge***. This is seen to be essential to enable efficient and effective SC operations, and of vital importance in coordinating and instigating a humanitarian response. In both developmental and emergency responses, interviewees felt that local knowledge was the best source of information to combat the lack of specifications. However, they also acknowledged that this information is difficult to obtain and even more difficult to quantify. While humanitarian organisations are known to have varying levels of integration with the local population (Holguín-Veras et al. 2012b), the primary data provides evidence that even where no permanent presence within the local area is sought, the respondents value local information very highly. This can also be a mechanism to avoid an imposition of Western values and morals, rather that something that is meaningful and participatory at a local level, and that local interests are under-represented (Hilhorst 2002). Planning needs to be inclusive of local culture and structures (Perry 2007, Macrae 2008), leaving it in the hands of global organisational

structures risks a disconnect with the field level and the needs of the beneficiaries in each locale (Pettit and Beresford 2009, Chandes and Pache 2010). This will be further explored in later parts of this chapter that relate to the *Behavioural Complexity* half of the proposed conceptual framework.

5.3.2 Elimination and Identification of the Generative Mechanism Relating to No Clear and Quantifiable Specifications

As the above discussion has demonstrated, the primary data collected, as well as the extant literature, contain evidence of the existence of the generative mechanism under investigation here. MSCs within HL, as evidenced by the case studies, are subject to a lack of optimal solutions derived from quantifiable evaluation, as there are no clear and quantifiable specifications. Key themes identified included:

- Poor data availability results in increased uncertainty within the system, which has to adapt to highly dynamic situations with great flexibility rather than relying on sophisticated forecasting.
- As local knowledge is a key data source, much information relevant to the system is held by individual entities within the system rather than being organised centrally.
- Centralised structures for both needs assessment and impact assessment are missing, and while individual entities carry them out, learning is highly decentralised.
- There is no overall assessment of performance that could inform a more structured learning process for the entire system rather than reliance upon individual entities and interactions.

The underlying generative mechanism of *No Clear and Quantifiable Specifications* is furthermore linked to other proposed generative mechanisms. Once again, the generative mechanism is connected to *Complexity and Interdependency*, but also exhibits strong direct interactions with *Non-Routine Operations*.

5.4 Multitude of Diverse Stakeholder Views

In the *Behavioural Complexity* half of the proposed MSC conceptual framework, one aspect is the *Multitude of Diverse Stakeholder Views*. Strong evidence of this generative mechanism has been found across the three case studies, as well as the initial interviews, suggesting that factors attributable to this area of HL constitute major

contributors to the problems encountered in this operational context. The emergent themes from each of the four rounds of data collection are summarised in Table 40.

Table 40: Multitude of Diverse Stakeholder Views — Cross-Case Analysis

Initial Interviews	Africa Case
• *Donors* have a significant influence on the basic ability of humanitarian organisations to operate, as well as shaping their priorities and accountability • *Beneficiaries* are important stakeholders, but planning and consulting interactions with them are often limited • Interactions with the *military* are inevitable in many humanitarian responses and potentially very useful, but also fraught with difficulties • *Cultural differences* are one particularly prominent feature in the interactions with stakeholders • *The local community* is inevitably involved in humanitarian responses, but while local knowledge is highly valued, organisations struggle with these interactions	• *Continuity* in the involvement of both beneficiaries and donors is essential in developmental responses • Organisations have to work very closely with the *local community* to ensure that their work has the best impact possible • There are numerous *cultural barriers* in developmental humanitarian work in Sub-Saharan Africa • *Sustainability* of the humanitarian operations, as well as the preparation of a successful exit of the humanitarian organisation are major concerns
Haiti Case	**Pakistan Case**
• *Beneficiary involvement* is seen as crucial in a very complex situation in a country that was already deeply impoverished before the earthquake • *Media attention* was a key determinant of donor involvement, as well as the number and experience of the humanitarian organisations involved • *Accountability to donors* is an important stakeholder pressure shaping and guiding the performance of HL • *Military support* played an important role in organising the humanitarian response in Haiti, but also created tensions	• *Communication with donors* was seen to be a challenge, in particular regarding the ear-marking of funding • *Beneficiary involvement* was limited because of the security concerns inherent to this particular humanitarian response • The highly political context of the response resulted in significant *military involvement* that created tensions • *Cultural issues* were apparent, particularly in the non-linear approach to planning that was seen to be prevalent within the area.

Several themes are shared across multiple case studies, with the two emergency response case studies showing particular similarities, while the developmental Africa case study features some unique, more long-term oriented concerns. Some themes are related to particular stakeholder groups while others pertain to wider concerns across multiple stakeholder groups. Overall, findings demonstrate that stakeholders and their varied agendas and expectations form a particularly difficult part of HL. This section investigates the primary data for proof of the existence of the postulated generative mechanism that humanitarian SCs, if they are to be MSCs, have a multitude of stakeholders with differing sets of values, lacking a unified goal or centralised control.

5.4.1 Key Themes Identified Relating to Multitude of Diverse Stakeholder Views

Issues raised by respondents solely within the Africa case study appear to be related to the developmental nature of the response, highlighting concerns over ***continuity and sustainability***. Interviewees point to efforts to integrate their work with the local community to ensure a high impact, ideally well beyond the duration of the humanitarian response, stressing the importance of preparing for a successful exit to ensure no dependency upon humanitarian interventions develops. This corresponds to a growing concern with the longer-term impact and sustainability of humanitarian operations (Van Wassenhove 2006, Kovács 2011), which is also echoed in broader literature on stakeholder engagement and management (Sayce et al. 2004, Buysse and Verbeke 2005, González-Benito and González-Benito 2006). It is however noteworthy that such concerns were not prominent amongst respondents in either of the emergency response case studies, which could point towards a disconnect between the immediate response phase and developmental efforts with their broader time horizons.

An issue that was solely raised in the Haiti case study is the significant ***media attention***, which respondents regarded as a key determinant of donor involvement, and a driver of the number of humanitarian organisations involved, particularly in regards to inspiring less experienced organisations to attempt to contribute to the humanitarian response. The relationship with the media is often a strained one, but it remains essential for donations and generally passing on information to stakeholders (Faulkner 2001, Ritchie 2004, Van Wassenhove 2006, Lettieri et al. 2009). The link between media attention and donations is well established. Humanitarian organisations usually receive most of their donations once a disaster has struck and is reported in the media, which makes advance planning and continuous investment difficult (Day et al. 2012). Along with donations, the Haiti earthquake and the media attention it received also

resulted in a multitude of humanitarian organisations responding. Some specifically formed for this response, which was discussed critically by respondents in this case study due to the new entrants' lack of experience, particularly in a very challenging operational environment, both culturally and in terms of the devastation wrought by the earthquake. The media is seen to be closely tied to other key stakeholder groups, such as humanitarian organisations and donors, and as such contributes a great deal to the behavioural complexity of HL. Exposure to disaster reporting in the media increases the amount of unsolicited donations and might create a mismatch between the amount of donations and the resources available to handle them (Lettieri et al. 2009, Charles et al. 2010, Kovács et al. 2012). However, while the role of the media was occasionally mentioned in the other case studies, it did not constitute a major theme, not even in the other emergency response case study, where it was indeed felt that a lack of media attention harmed the response as donations were sparse in relation to the magnitude of the disaster in Pakistan.

Cultural barriers, differences, and issues in general were highlighted as concerns in all but the Haiti case study as complicating the interactions with stakeholders in the host country or region. Particular examples given included the non-linear planning approach often taken in Pakistan, and the inability to rely on promises the same way as might be expected in the cultural context of donor countries, or the home countries of most humanitarian organisations and many of their employees. The multi-cultural nature of HL has previously been highlighted as a key concern for both research and practice (Lappenbusch 2006, McClintock 2009, Kovács et al. 2012). While inter-cultural SCs are common in the commercial context, in humanitarian work, organisations are often unable to select the partners they wish to work with, but are forced into SC relationships based on the criticality of demands, which exacerbates cultural issues (Kovács and Spens 2007, Beamon and Balcik 2008, Kovács and Tatham 2010). Several respondents pointed out the importance of hiring staff in the field who are culturally sensitive, or ideally even from within the cultural context in which the response takes place. The resulting diversity of the humanitarian sector can seem chaotic, but provides an important cultural and psychological interface with local populations (McClintock 2009, Cross 2011), as well as a certain degree of protection in crisis situations when various governments would be concerned about the safety of their humanitarian workers (Long and Wood 1995).

The military as a stakeholder contributed to the messiness of HL in all but the Africa case study. ***Military-humanitarian cooperation*** has experienced a steady rise in

recent years, no longer being limited to sudden-onset disasters, but is increasingly also seen in slow-onset ones (Cross 2011, Seipel 2011). However, the military did not feature as a key stakeholder in the Africa case study. While military-humanitarian cooperation was seen as potentially highly valuable and often inevitable, particularly in regards to organisational or infrastructural problems, respondents recognised that involvement with the military was fraught with difficulties. At times respondents regarded military involvement as threatening the neutrality of humanitarian operations and entangling them in political issues beyond their remit.

Logistics as a discipline has a long history within the armed forces, which have thus developed a body of expertise (Lummus et al. 2001, Christopher 2005). Nevertheless, expeditionary logistics are also fraught with difficulties and the need for constant improvement and adaptable approaches is recognised (Van Crefeld 2004). Despite their expertise, the military still faces many of the same issues and complications in emergency and developmental responses as humanitarian organisations, adding a further level of complexity to their interactions. There is a body of literature surrounding the difficulties of interacting with the military in a humanitarian context (Pettit and Beresford 2005, Cross 2011, Seipel 2011, Heaslip et al. 2012, Heaslip and Barber 2014, Capie 2015, Tatham and Rietjens 2016). The concern of the respondents that cooperating with military forces compromises their neutrality, as they are a stakeholder group with a very different set of underlying values, and therefore views of the situation.

Donors featured as key stakeholders across all case studies, but the focus of concerns surrounding donors differed among the case studies. In the Africa case study, respondents stressed the difficulties of continually involving donors, which enables a developmental response and makes it sustainable (Beamon and Balcik 2008, Jahre and Heigh 2008, Day et al. 2012). In the Pakistan case study, the earmarking of funding was seen as a problem, with a certain level of competition for funding with the Haiti earthquake response in the same year, a well-known problem (Hilhorst 2002, Thomas and Kopczak 2005, Beamon and Balcik 2008). The uncertainty of funding and its detrimental impact on SC development and best practice in HL has been highlighted numerous times in literature, and findings in this study echo this (Van Wassenhove 2006, Jahre and Heigh 2008, Charles et al. 2010). Finally, accountability to donors was seen to be shaping responses and practices by respondents in both the initial interviews and the Haiti case study. This pressure has been highlighted in literature as a major contributor towards performance measurement in humanitarian organisations (Kaplan

2001, Hilhorst 2002, Slim 2002, Davidson 2007, Beamon and Balcik 2008, Everett and Friesen 2010, Harvey et al. 2010). The findings from this study reinforced the crucial role donors play in HL, and also highlighted the significant complexity they add, as their demands vary and operations can only be sustained if they are continuously engaged and willing to contribute to areas in which funding is currently required.

Across all cases, the stakeholder group most prominently featured in interviews were ***beneficiaries and local communities***, which reinforces their role as customers of the humanitarian SC, even though they tend to not financially remunerate humanitarian organisations for their services and goods (Oloruntoba and Gray 2009, Charles et al. 2010, Schiffling and Piecyk 2014). Respondents in the initial interviews recognised that importance, but also admitted that planning and consulting interactions are limited, which was stressed in the Pakistan case study where security concerns were highlighted as considerably inhibiting beneficiary involvement. These findings congruent with literature that states that beneficiaries are important, but often overlooked stakeholders owing to their complex and non-contractual relationship with humanitarian organisations (Hilhorst 2002, Oloruntoba and Gray 2009, Pettit and Beresford 2009, Kovács et al. 2010). However, in the Haiti case study, interviewees felt very strongly about the need to involve beneficiaries, particularly because of the highly vulnerable situation in the country, even prior to the earthquake. In the light of sustainability concerns, respondents in the Africa case study also acknowledged that engaging with local communities is essential to ensure the impact of their work. Local community involvement is a further dimension of beneficiary involvement that has been mentioned in the literature, as gaining beneficiaries' trust is regarded as essential to both the safety and the success of the mission (Hilhorst 2002, Lettieri et al. 2009). Contradicting this, respondents in the Pakistan case study expressed concern that further beneficiary involvement would actually jeopardise the security of their response. The differing perspectives on beneficiary involvement across the case studies serve to highlight the various concerns surrounding this important stakeholder group. While the importance of working with beneficiaries is universally acknowledged, it is challenging to implement in practice, particularly in the emergency response case studies. These difficulties with stakeholder involvement are characteristic of messy situations (Calton and Payne 2003, Beattie et al. 2012).

5.4.2 Elimination and Identification of the Generative Mechanism Relating to Multitude of Diverse Stakeholder Views

Evidence supporting the existence of the generative mechanism has been found within the primary data collected, as well as the extant literature. The section has provided a detailed discussion of aspects that confirm that SCs in HL have a multitude of stakeholders with differing sets of values, lacking a unified goal or centralised control. Key themes identified included:

- Individual elements within the system and the interactions between them are easily influenced by influences such as cultural context or media reporting, creating new emergent behaviours.
- Underlying values and aims of the HL system are not shared among all actors, prominently showcased by the humanitarian-military interactions.
- Donors assert a strong influence upon HL, which has a tendency to sway the organisation of the system in their favour and lead to associate learning and evolution of system characteristics.
- Conversely, beneficiaries exert little control upon the system, resulting in misrepresentation or underrepresentation of their views and priorities and little subsequent system evolution in their favour.

The underlying generative mechanism of *Multitude of Diverse Stakeholder Views* is connected to other generative mechanisms, in particular *Non-Routine Operations* and *Sociopolitical Impact,* but also with *Complexity and Interdependency*, which forms a background to the *Multitude of Diverse Stakeholder Views* generative mechanism.

5.5 Sociopolitical Impact

The second aspect of the *Behavioural Complexity* half of the proposed MSC conceptual framework is the *Sociopolitical Impact*. This featured particularly prominently across all the cases, evidence of the presence of factors in this area that contribute to the messiness of HL. Table 41 summarises the key themes that emerged from the data for this aspect. Here, the themes are most consistent across the three case studies and the initial interviews with most occurring in all four sets of interviews. In the previously discussed aspects of the framework, themes were more widely spread, highlighting differences, particularly between the emergency response case studies and the developmental case study. There are fewer themes within this aspect of the framework, however, these themes were discussed in depth and highlighted as very important by the interviewees.

Table 41: Sociopolitical Impact — Cross-Case Analysis

Initial Interviews	Africa Case
• *Governmental donations* present a major part of the funding of many humanitarian organisations, tying them to politics • *Neutrality* as a core humanitarian principle can be difficult to uphold amidst the realities of humanitarian responses • Humanitarian responses often face distrust or criticism from *society* at large in the area or even the nation they occur in • *Politics* within the area or the nation in which a humanitarian response takes place can influence it, as well as be influenced by it	• *Politics* within the recipient country are even more prominent in developmental humanitarian responses where priorities of host governments and humanitarian organisation need to align • Politics within the donor countries play a major role in the *continuity of funding* that is essential for developmental work • *Neutrality* as a core humanitarian principle can be difficult to uphold amidst the realities of humanitarian responses • Developmental work plays a large role in *shaping society* within the recipient country
Haiti Case	**Pakistan Case**
• *Global political priorities* determine the amount of attention and resources the humanitarian response receives and need to be managed carefully • The *national government* of Haiti has been criticised for uncooperative behaviour, exerting its sovereignty particularly in regards to the import of humanitarian supplies • Especially in the interactions between the many humanitarian organisations present in Haiti *neutrality* is a concern • A lack of willpower in making *sustainable changes* in the political and social landscape in Haiti has been observed	• It is of vital importance to respect the *political agendas* both locally and globally without becoming directly involved in them • *Tribal structures* played a very important role in reaching affected populations and ensuring the safety of humanitarian organisations • *Government funding* as a key source of income for humanitarian organisations is often tied to political priorities and as such calls humanitarian principles into question • Maintaining *neutrality* in a highly political context is a challenge that organisations have faced in very different ways

The similarity across the case study further stresses the weight these themes carry in the context of HL, with comparatively little dependence on the precise operational environment. Overall, it can be surmised that *Behavioural Complexity* is a highly relevant source of messiness in HL, with a particular focus on the *Sociopolitical Impact*. In the following, the themes that have emerged from the primary data are discussed across cases and linked to relevant literature. This section focuses on evidence from

both primary data and extant literature to ascertain the existence of the postulated generative mechanism that humanitarian SCs, if they are to be MSCs, have a significant sociopolitical impact on their environment, and in turn the environment has a significant sociopolitical impact on them.

5.5.1 Key Themes Identified Relating to Sociopolitical Impact

In the Africa and the Haiti case studies, respondents reported significant involvement with the ***host government***. Host governments are common stakeholders in HL (Kovács and Spens 2009, Tatham and Houghton 2011, Kovács et al. 2012, Pérouse de Montclos 2012). The previously mentioned focus on sustainable long-term projects became evident in the necessity to align political priorities and targets for the developmental humanitarian response in Africa. This adds a layer of complexity to the operations, as organisations do not determine their priorities on their own or with only their donors and direct beneficiaries. Political involvement might thus trigger concerns about neutrality. A lack of adequate governmental and administrative structures to support the work of humanitarian organisations has previously been highlighted as a point of concern (Long and Wood 1995, Pettit and Beresford 2009). This is particularly evident in the Haiti case study, where respondents raised the issue of uncooperative behaviour from the Haitian government, allegedly complicating humanitarian operations in the nation. Interviewees explain this behaviour as attempts to assert sovereignty in a chaotic situation.

Sociopolitical Impact was also evident in relation to the ***society*** within the host areas. This was pointed out by a variety of interviewees involved in all the different humanitarian responses that were part of this study. Impact could be locally constrained or applicable to the entire host nation. Developmental work in particular was regarded as playing a role in shaping society in the recipient country, but it was also pointed out that organisations faced distrust and criticism, and struggled to make sustainable changes, especially in the face of significant cultural differences. While the answers varied across the case studies, all demonstrate an underlying awareness of the potential for the initiation of sociopolitical change, but also a wariness of the unpredictable and occasionally adversarial operational environment impact critically. This uneasiness with the wider societal impact of SCs is also evident in commercial operations (New and Payne 1995, New 1997). Indeed, stakeholder management in itself often focuses exclusively on direct stakeholders, rather than considering the society as a whole and

the interactions it has with an organisation (Boland and Fowler 2000, McCool and Guthrie 2001, Foster and Jonker 2003, Micheli and Kennerley 2005).

At the other end of the SC, ***governmental donors*** play a major role in financing humanitarian operations (Long 1997, Hilhorst 2002, Hellingrath and Widera 2011). Respondents acknowledged this across the initial interviews and all of the case studies. They pointed out that the majority of their funding comes from governmental donations, highlighting that it is particularly important for continuity in funding, as governments form more long-term commitments than individual donors. This echoes similar themes that are present in the literature, highlighting the increasing, and highly politicised competition among NGOs for scarce donor funding (Bilodeau and Slivinski 1997, Van Wassenhove 2006, Beamon and Balcik 2008, Stoianova 2012). Nevertheless, respondents in the Pakistan case study in particular pointed out that governmental funding might call an organisation's neutrality into question, a reoccurring theme also mentioned in the *Multitude of Diverse Stakeholder Views* part of the conceptual framework.

Governmental donations are closely tied to the concern of being dependent upon ***global political priorities***, which underlines the sociopolitical impact across case studies. Respondents are keenly aware of the restrictions placed upon their operations, whether by financial means or through access restrictions or encouragement to engage in certain regions. Literature discusses the problem of donations being tied to external agendas rather than the precise needs of the humanitarian organisation (Beamon and Balcik 2008, Jahre and Heigh 2008). Especially in the Haiti case study, the influence of global politics was seen as comparable to the media in directing both attention and the flow of resources. Similarly to the previous discussion of media, respondents in the Pakistan case study were more critical of the same effect. There is often a distinct mismatch between resources available and resources needed, which is partially rooted in such external agendas (Charles et al. 2010, Kovács et al. 2012). While humanitarian operations are influenced by a wider political agenda, both locally and globally, some respondents also recognised chances to lobby and shape politics, particularly in the region in which a response takes place. These strong political and social dimensions fit well with the original descriptions of wicked or messy problems (Ackoff 1981, Rittel and Webber 2007, Tatham and Houghton 2011), thus putting additional pressure to find a fair and ethical solution upon the actors within the system (Calton and Payne 2003, Camillus 2008).

The most frequently repeated concern across the whole spectrum of *Behavioural Complexity* is that of ***maintaining neutrality*** in the face of stakeholder pressures and sociopolitical impact, which links to the fundamental humanitarian principles (Van Wassenhove 2006). Respondents across all the case studies reported struggles with neutrality, in interactions with other humanitarian organisations, as well as with governments on both ends of the SC, or with military forces. Some organisations displayed a very strong ethos and condemned organisations that were more willing to compromise on the core value of neutrality. However, literature highlights that compromises are frequent, particularly in relation to military support, as organisations do not want to compromise security, while profiting from the military's experience and capacities are often seen to outweigh the drawbacks (Tomasini and Van Wassenhove 2009, Seipel 2011, Heaslip et al. 2012, Capie 2015). Nevertheless, it has to be accepted that despite their expertise in expeditionary logistics, military forces in developmental and emergency responses still operate under many of the same constraints as civilian organisations and thus cooperation with them can help, but hardly offer a panacea. In the wider context of HL, concerns with neutrality are a further complicating factor that may inhibit practices that would otherwise be seen as beneficial in facilitating a more efficient and effective SC. To purists, the neutrality can be threatened at any stage of the SC, ranging from governmental donations to the sociopolitical impact of the host region, be that through governmental structures or less-organised forms of intervention, for example from local tribes or militia.

Overall, issues in this part of the conceptual framework show the greatest consistency across the case studies. While there are some variations, the underlying issues remain the same, with concerns being voiced over high-level problems rather than operational details. The sociopolitical impact is regarded by interviewees as fundamental to their work in HL to an extent that other aspects of the framework are not. This is congruent with literature on wicked and messy problems that are by their very definition complex social problems and have from the beginning been highly political (Mintzberg et al. 1976, Mitroff and Mason 1980, Camillus 2008)

5.5.2 Elimination and Identification of the Generative Mechanism Relating to Sociopolitical Impact

The discussion of the primary research data in the context of the extant literature has shown strong support of the existence of the postulated generative mechanism within the context of HL. SCs in HL, as represented by the primary data, have been

shown to have significant sociopolitical impact on their environment, and in turn the environment has a significant sociopolitical impact on them. Key themes identified included:

- Global political priorities create the external environment of the HL system and exhibit a significant, though highly changeable impact upon it.
- Governmental donations provide incentives and disincentives for certain interactions within the system and between the environment and entities within the system.
- Maintaining neutrality is a key aim of the HL system, but one that is constantly threatened and questioned both by entities within the system and the environment.
- The HL system asserts a highly dynamic influence upon both host governments and society in host countries, much of it emergent over the course of a humanitarian response.

The underlying generative mechanism of *Sociopolitical Impact* is furthermore connected to other generative mechanisms. It includes fundamental issues that create a foundation for the elements of *No Clear and Quantifiable Specifications, Non-Routine Operations, and Multitude of Diverse Stakeholder Views,* but interacts most closely with the latter. *Complexity and Interdependency* is also connected to *Sociopolitical Impact.*

5.6 The Revised Conceptual Framework

Within the critical realist paradigm, the existence of various explanations for the occurrence of a certain event or behaviour is accepted (Sayer 2000, Hodgkinson and Starkey 2012). This chapter has focussed on the generative mechanisms underlying the empirical evidence presented in Chapter 4 (Mingers 2000a, Mingers 2006a). Through the critical realist RRREI method of logical abduction, generative mechanisms for the perceived messiness in the SCs under investigation in this study have been identified as part of the *Real* ontological domain applying the steps of *Retroduction, Elimination,* and *Identification* (Rotaru et al. 2014). With the application of abductive interference, all five of the elements of the proposed conceptual framework (Figure 34) have been shown to be underlying generative mechanisms. Having been validated against the empirical data gathered and evidence from extant literature none of the constructs proposed as generative mechanisms had to be eliminated as invalid.

A revised conceptual framework is presented here, based upon the research findings gained from the RRREI method, following the prescribed process from the *Empirical* ontological domain evident in the empirical knowledge, through the *Actual* domain of events and behaviour, to the *Real* domain which reveals the underlying generative mechanisms (Danermark et al. 2002, Downward and Mearman 2007, Rotaru et al. 2014). This revised framework was developed based on the analysis and discussion of the primary data presented in this chapter so far. As all five generative mechanisms have been confirmed to be valid, the elements of the revised conceptual framework are the same as those of the initial conceptual framework. However, while all five generative mechanisms are valid, the relationships sketched between the five elements in the initial framework were not confirmed in this study.

The initial conceptual framework (see Figure 34) had portrayed the five elements, arranged in a network with *Complexity and Interdependency* in the centre and a behavioural complexity and a dynamic complexity half, accounting for the different categories of complexity established in extant literature. All five elements were shown in distinct boxes of equal size, as it was assumed that all had similar contributions to messiness in MSCs. Linkages between the five elements were depicted as arrows connecting the boxes. There were bidirectional arrows between the two boxes in the dynamic complexity half of the framework and between the two boxes in the behavioural complexity half, but none between the two halves. Unidirectional arrows connected each box to the *Complexity and Interdependency* box portraying the assumed contribution of each of the four outlying elements to the central one. There was no particular weighting given to any element in the extant literature and no strong indication of the nature of the links between them.

From the primary data, it has become evident that the initial assumptions of equal weightings and linear corrections were too simplistic and did not adequately portray the situation found in the particular MSC context under investigation. While there is clear evidence for the influence that all five elements have, they did not emerge to be equal in their contribution to messiness. This has been detailed in the discussion of each of the five elements above. Some were regarded to be more manageable than others, with visibility of problems an important factor to determine how significant their contribution was. Elements that lacked visibility were generally described to be more problematic and more difficult to manage.

Furthermore, the relationships between the elements were shown to differ from those that were initially proposed in the framework. In the *Elimination and*

Identification sections of the present chapter, the linkages between the individual elements are outlined as they appeared from the data. In establishing the linkages, the analysis took into account the way in which themes occurred in interviews and which themes were closely interrelated with themes aligned to other elements of the initial conceptual framework. While the closest connections are those between elements within the behavioural or dynamic complexity half respectively, the two halves are linked. Most significantly, *Complexity and Interdependency* has been shown to have a link with each of the other elements, but contrary to their initial depiction, it is not so much the other elements influencing *Complexity and Interdependency* as the element in itself encompasses and shapes all the others. Difficulty in distinguishing *Complexity and Interdependency* from the other factors has been expressed as part of the analysis.

Thus, the initial conceptual framework has been found to be an incomplete representation of the evidence found in the primary data, as the five generative mechanisms all exhibit differing effects upon the messiness and thus the applicability of commercial logistics and SC management tools and techniques in MSCs. Therefore, a revised conceptual framework is proposed (Figure 35).

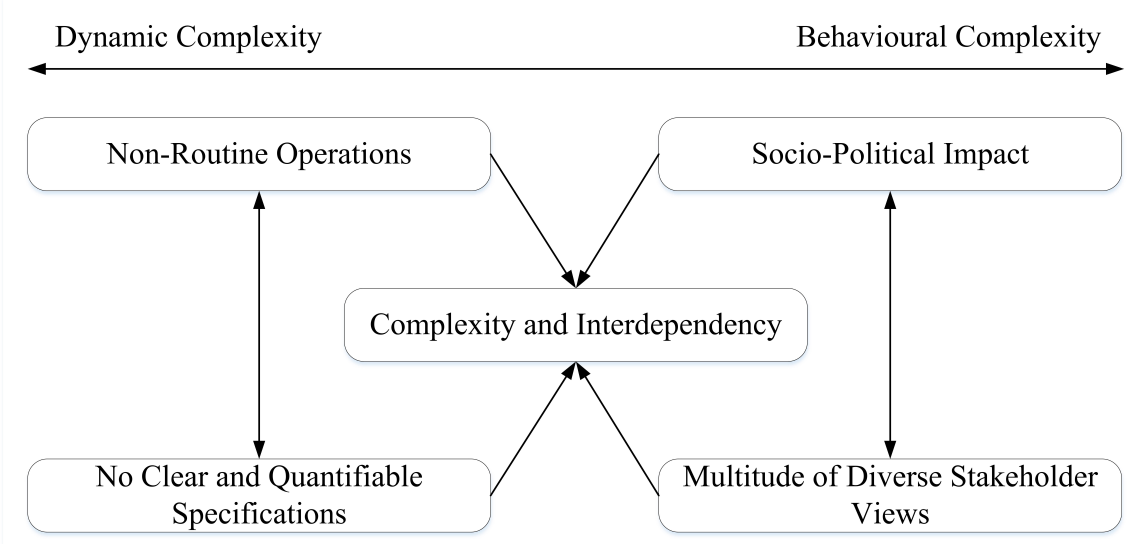
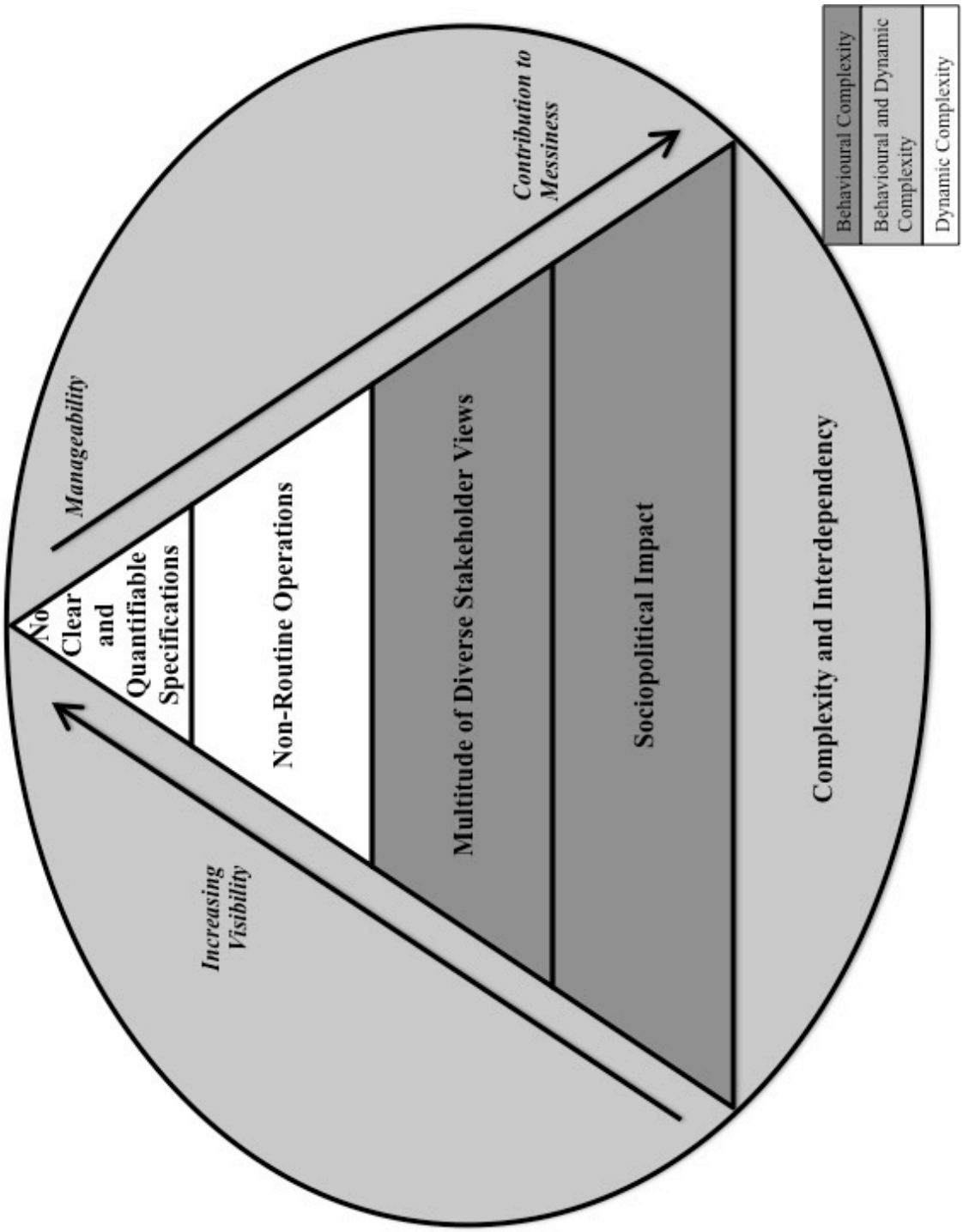


Figure 34: A conceptual framework for messy supply chains (author's own figure)

The revised framework (Figure 35) maintains the same five elements as generative mechanisms, but displays them arranged differently, thus better capturing the complexity found in the primary data and detailed above. Most significantly, the relationships between the five elements have been depicted differently in accordance with the linkages identified in the discussion and analysis above. Rather than distinguishing between behavioural complexity and dynamic complexity as the key

criterion to arrange the different elements, the elements are now organised according to the relative visibility of the identified generative mechanisms. This newly introduced variable has been shown to have an impact on how manageable the messiness contributed by a particular element is in the MSC.

Figure 35: The revised conceptual framework (author's own figure)



The visual representation has been adapted (see Figure 35). In the following, the changes and the rationale behind them will be explained in more detail.

Rather than splitting the diagram into two halves, behavioural and dynamic complexity are now represented as shades of grey. Behavioural complexity is depicted in dark grey, dynamic complexity in white. *Complexity and Interdependency,* which contains both, is shown in light grey. Based on the previous discussion, *Complexity and Interdependency* is depicted as the background, encompassing the other four generative mechanisms, as it interacts with each of them. The remaining four are arranged in a pyramid shape. The relative size of each of the elements within the pyramid is a visual representation of the magnitude of its contribution to messiness. From the top to the bottom of the pyramid, visibility of the generative mechanisms in the SC decreases. While it is obvious if a SC lacks quantifiable specifications, for example for performance measurement, sociopolitical impact is much more difficult to capture, as it might involve an entire society. However, the lower layers of the pyramid also have a larger contribution to the overall messiness of the SC. The behavioural complexity of stakeholders and sociopolitical issues has been shown to have a particularly significant impact on HL as evidenced by the case studies; therefore these form the base of the pyramid.

The portrayal of MSCs in the revised conceptual framework is a more accurate representation of the reality of MSCs, such as the ones under investigation in this study, and thus enhances the understanding of such complex operations. In the future, this improved understanding is anticipated to result in a better assessment of the applicability of existing logistics and SC management knowledge, and to serve as a guideline in the adaption of tools and techniques. Figure 35 below depicts the revised conceptual framework. In the following section, this will be discussed in more detail.

The element of *Complexity and Interdependency* was the central tenet in the proposed conceptual framework. However, given its overarching importance, it has now been redeployed to a place of even greater prominence, serving as the background for the entire conceptual framework for MSCs. This is a reflection upon the close relationship this element has been established to have with each of the other four. This element forms the foundation upon which the understanding of MSCs is based, harking back to knowledge from the systems approach, as well as the study of CAS. One of the key ideas of this way of thinking is the impossibility of splitting one complex problem situation into individual, more manageable problems that can be solved to subsequently achieve an overall solution, this element of the framework brackets all of the others that

in turn contribute to it. From the primary data, it became evident that while there are several themes emerging that cannot easily be placed within one of the four other aspects of the framework, most themes in the *Complexity and Interdependency* element are closely interlinked with those within the other four elements. As the study of SC management is anchored in a strong systems thinking belief, this is an area for which practitioners and academics have developed a certain level of understanding. Problem situations in "ordinary", that is non-messy, SCs exhibit such traits as well, thus making *Complexity and Interdependency* a necessary, but not a sufficient condition for an MSC. This generative mechanism develops an interface between dynamic and behavioural complexity.

In all of the case studies, evidence of the elements of MSCs as defined in the conceptual framework has been found, although to varying degrees. Particularly significant contributions to messiness stem from the factors with a high behavioural complexity, the *Sociopolitical Impact* and the *Multitude of Divergent Stakeholder Views*. This could be a major reason why tools and techniques from commercial logistics do not always apply in a humanitarian context. The two elements are presented in dark grey in the framework. The issues these elements pose are less apparent to an external observer, and while they are easily identified by the respondents, themes discussed as part of those two elements tend to be broader and less tangible than those allied with dynamic complexity.

In the revised conceptual framework, the two generative mechanisms associated with behavioural complexity (*Sociopolitical Impact* and *Multitude of Diverse Stakeholder Views*) form the foundation of a pyramid, signifying their disproportionally large influence upon messiness in these SCs and the wider issues associated with them. This has become particularly evident in the data analysis and discussion for the element *Sociopolitical Impact,* which has been shown to tie SCs to global political priorities and other wider concerns. Along with the *Multitude of Diverse Stakeholder Views* these elements clearly demonstrate close ties with the external environment of the open system of an MSC. Much of the messiness identified in the SCs has its origin in issues related to these two elements of the framework, which present the added challenge of being less visible and more challenging to address. The behavioural complexity is found to be more difficult to address and manage in the SCs, occurring as it does outside the established remit of logistics and SC management activities, as the generative mechanisms identified here are the interactions the SCs have with the wider environment in the form of stakeholders and sociopolitical issues.

The two elements of dynamic complexity (*Non-routine Operations* and *No Clear and Quantifiable Specifications*) have been shown to contribute to messiness as well. The themes linked with two these elements of the framework are more varied, more dependent upon the individual operational context. Nevertheless, as they are often addressing smaller issues, they present less severe challenges according to the respondents in this study. Themes and the issues resulting from them are more apparent, even to external observers. This is particularly true for *Non-routine Operations*, which would seem to present a major difference to other SC operations, but are not necessarily perceived as such significant contributors to messiness amongst the respondents. On the contrary, routines are habitually adjusted to the operational environment with its challenges, and organisations are used to and able to respond flexibly to such problems. While the *No Clear and Quantifiable Specifications* element is acknowledged as a problem in the SCs under investigation, this generative mechanism is regarded as a less fundamental contributor to messiness. In the revised conceptual framework, this is represented by assigning smaller levels of the pyramid to the elements of dynamic complexity. It has to be acknowledged that the generative mechanisms related to dynamic complexity, displayed in white in the above framework, are generally manageable with common SC and logistics tools and techniques that are applicable in non-messy situations, although these might have to be adjusted to suit the particular operational requirements.

Interactions between the different elements mainly occur through the *Complexity and Interdependency* element, as pictured by this element encompassing all of the others. However, there are some direct relations. For example, neutrality features in both the *Sociopolitical Impact* and the *Multitude of Diverse Stakeholder Views* parts of the framework, essentially linking the two neighbouring elements. The revised conceptual framework thus presents a more realistic and holistic view of MSCs and their underlying generative mechanisms as confirmed by the primary research and existing literature. The following section discusses HL as an example of MSCs as confirmed through the primary research. This is representative of one context in which MSCs occur. Other examples of MSCs are conceivable and will have to be addressed in further research as outlined in Chapter 6 of this thesis.

5.7 Humanitarian Logistics: An Example of Messy Supply Chains

Through the revised conceptual framework, a better understanding of the unique characteristics of HL as an example of MSCs is achieved. The prevalence of

behavioural complexity among the generative mechanisms identified as underlying events and behaviour in the *Actual* empirical domain can explain why approaches and techniques from commercial logistics and SC management are not necessarily successful in the humanitarian context. These insights are expected to contribute to the development of management approaches that can further improve the efficiency and effectiveness of HL by taking into account all of the generative mechanisms identified here.

As discussed previously, themes relating to all five of the elements of the conceptual framework have been identified across the three case studies and the initial interviews. With the strong behavioural complexity component, messiness in HL has been identified as being generated predominantly by themes within the *Sociopolitical Impact* and the *Multitude of Diverse Stakeholder Views* parts of the framework. Overall, a better understanding of the CAS has been achieved by classifying the main themes emergent from the primary data and in large parts supported by existing literature, in broad generative mechanisms. Apart from the contribution to knowledge through developing a framework for MSCs in general, this study therefore also contributes to the understanding of the particular context of HL, crucially across both different humanitarian response and humanitarian organisations. Figure 36 utilises the revised conceptual framework in the context of HL, thus showing one example of MSCs.

Each of the five elements identified in this framework is a generative mechanism. Depicted in dark grey are the generative mechanisms related to behavioural complexity. Those associated with dynamic complexity are shown in white, while light grey has been chosen to represent *Complexity and Interdependency*, as this generative mechanism straddles both dynamic complexity and behavioural complexity. It is apparent within the context of HL that the behavioural complexity generative mechanisms are perceived as more difficult to address, owing to both their lower visibility and their extension beyond the immediate system of the SC. HL is shown to be an open system with strong interactions with its environment captured by those two generative mechanisms, adding considerable messiness to the operations.

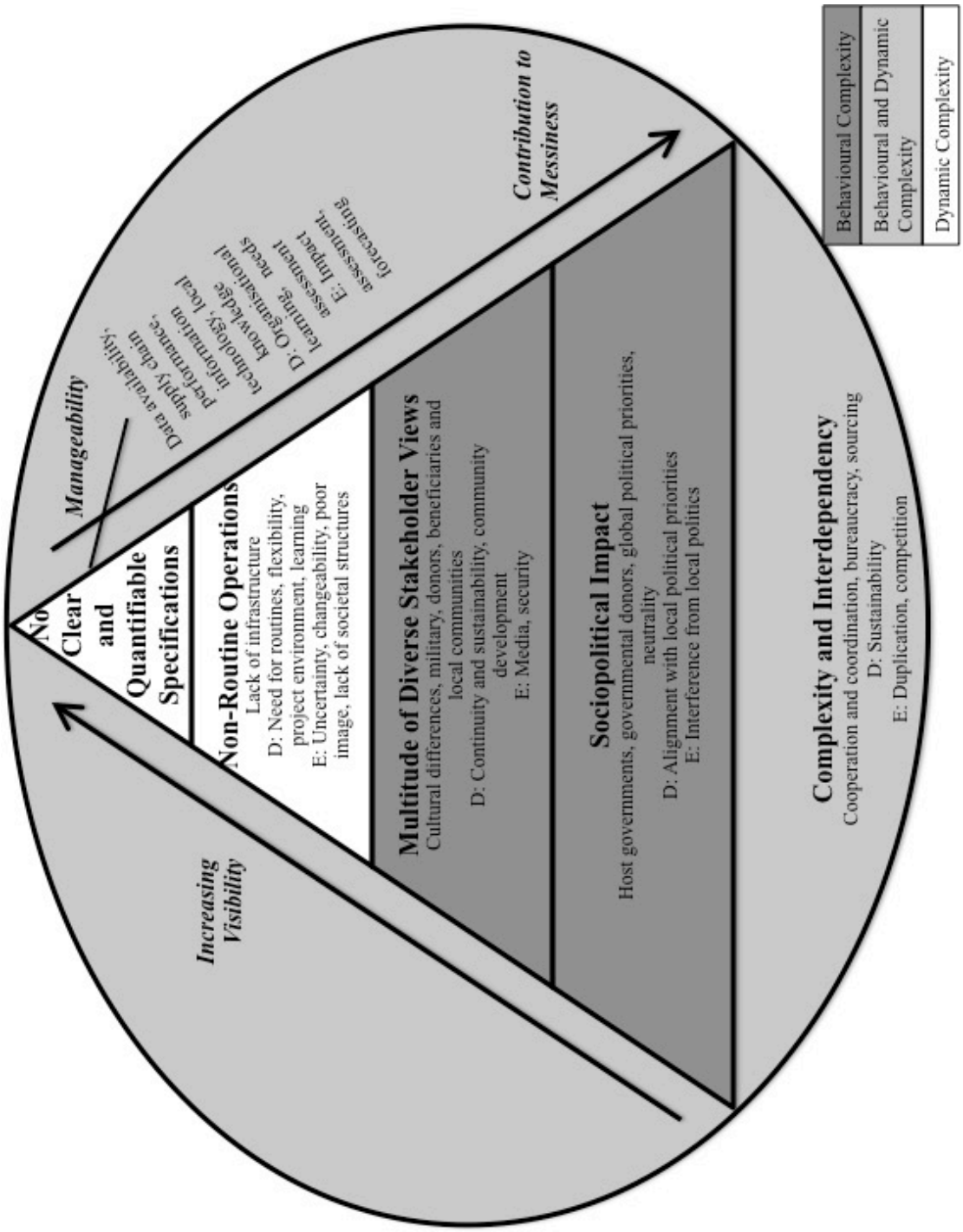


Figure 36: The Revised Conceptual Framework in HL (D = Developmental Response, E= Emergency Response) (author's own figure)

In Figure 36, examples of themes evident in the primary data are given for each of the five elements of the framework. These are split into themes that were evident in all contexts, and those specific to either developmental or emergency responses. Solely within the area of *Non-Routine Operations* the vast majority of themes differs between the two response types, with emergency responses understandably showing evidence of much less routine than what is exhibited in developmental responses. The least differentiating factors are evident within the element of *Sociopolitical Impact* in which only a difference in the importance of local politics was apparent within the primary data. While there are almost identical numbers of themes identified in each generative mechanism, the themes towards the top of the pyramid, in the dynamic complexity part of the framework, have a tendency to be more specific, while themes towards the bottom of the pyramid are generally broader, relating to wider societal issues as befits the behavioural complexity domain. As visibility of issues increases towards the top of the pyramid, it is easier to identify and comprehend them, which could explain the greater level of detail that respondents were able to provide on these issues. Furthermore, problems such as the management of uncertainty, performance measurement or the use of information technology are common within SCs across a wide variety of operational contexts. While they contribute to messiness, these are not issues that are unique to MSCs, thus enabling actors within those SCs to respond to these common problems with greater confidence and experience.

5.8 Application of the Framework in Different Contexts

The conceptual framework developed as part of this thesis applies to MSCs in a wide range of contexts, not merely within HL. While it is beyond the scope of the present work to establish and explore the framework in other contexts, this section provides an overview of some potential areas of application that could then be explored within the remit of future research carried out on MSCs. To qualify as an MSC, a SC has to exhibit all five of the generative mechanism outlined in the conceptual framework. However, MSCs might display them to varying degrees. While they always remain CAS, MSCs experience different contributions to their messiness from the five underlying generative mechanisms. The relative importance of each generative mechanism might even change over the lifecycle of a particular MSC as different issues are addressed by management, or alternatively, areas are exacerbated by changes in the environment, for example through a significant political shift, such as the recent Brexit decision.

While evidence of each generative mechanism was discovered in both the primary data and the extant literature on HL, there was a focus on the behavioural complexity aspects of the conceptual framework over the dynamic complexity. However, there might be differing contributions of generative mechanisms towards MSCs in various contexts.

Another context that might be found to have MSCs are large events, such as music festivals or major sports tournaments. Such SCs are emergent and dynamic as locations vary, as do the demands depending on the exact nature and size of the event. Nevertheless, companies and organisations involved in events develop a routine for such demands, facilitating flexibility in the SC. With advance planning, there can be fairly accurate specifications. For example, capacity constraints on attendance will provide parameters for demand data. The sociopolitical components and stakeholder involvement can be significant, as seen in protests against major sporting events, such as the recent Olympic Games in Rio de Janeiro, Brazil, or the controversies surrounding the award of the Football World Cup tournament to various nations. SCs to such events will therefore face significant complexity from those generative mechanisms and also show a great interdependency with national and international bodies.

Another potential operational context for MSCs is the military. The most obvious example is expeditionary logistics, SCs supporting armed forces during campaigns, which are highly complex and forced to operate under constantly changing conditions as the military campaign advances (Van Crefeld 2004). As such, they exhibit many similarities to HL as highlighted in parts of the previous discussion on humanitarian-military interactions. In Chapter 2, the military environment was highlighted as a key to developing notions and practices of logistics before their wider adoption in commercial environments. While there is thus a long-lasting tradition of logistics in the military context, this does not imply that MSCs do not occur. While the sociopolitical impact in military supply chains is largely apparent to the casual observer, their non-routine nature might be less so. However, as has been previously discussed and shown in the case of HL, the aspect of non-routine operations does not necessarily mean an inability to manage them, but rather a constant pressure to adapt and exhibit flexibility, which might well be a concern in a military SC as well.

The MSC framework has been applied to peacetime military SCs in the context of low priority spare parts demands for the United Kingdom Royal Navy's Type 45 destroyer fleet (Haigh 2016). The SC for spare parts is more complex for this fleet than for previous warship types, not only because the equipment and systems installed are

innovative and often bespoke, but also because of the interrelationships between the numerous supporting stakeholders. For the first time in the Royal Navy's history, these stakeholders include a commercially operated manager paid to provide system availability and disincentivised to hold expensive stocks of inventory.

In applying the MSC framework to various SC contexts, a key differentiating factor to other SC frameworks is that it is following the CAS way of viewing SCs as systems that lack a central element of control, such as a strong customer that can impose its views upon suppliers, as is the case in certain commercial SCs. In MSCs, organisation cannot be enforced in such a centralised, top-down approach. Rather, MSCs rely upon the self-organising and adaptive properties of the system, with individual entities establishing relationships that shape the topography of the SC, following more of a bottom-up approach to management that is rarely captured within the main body of logistics and SC management literature. This has implications for the applicability of standard management tools and techniques. Without a significant element of central control, they might be difficult, if not impossible, to enforce. For example, different ways of incentivising various players within the SC might have to be explored, which was one of the key concerns in the MSC study carried out within the Royal Navy (Haigh 2016), but has also been highlighted in the management of contractors and suppliers in the construction of London Heathrow's terminal 5 (Hancock 2010).

Furthermore, MSCs necessitate a holistic view of the SC. It is essential to recognise that such complex problem situations with significant behavioural components cannot ever be fully solved in the way of tame problems. While it is desirable and often necessary to address issues presented by MSCs, MSCs will retain their inherent complexity. While the impact of each of the generative mechanisms on the messiness of a particular MSC can be reduced, it is not possible to eliminate the underlying generative mechanisms entirely. Their contributions have to be recognised and understood to enable entities in MSCs to function effectively and to contribute to the improvement of the entire system. The focus of management efforts will shift, as MSCs are better understood and according to the individual circumstances of each SC, which highlight different generative mechanisms as key contributors to the messiness, as has been illustrated through the examples of potential MSC contexts provided within this section. Nevertheless, the complexity and interdependency remains, and none of the levels of the pyramid in the MSC framework can be eliminated.

5.9 Summary

This chapter has provided a cross-case analysis of the primary research findings and a discussion linking the findings to existing literature in the area of HL, as well as broader SC management, operations management, and systems thinking. Each of the five elements of the proposed conceptual framework has been discussed in detail, identifying common themes for each that emerged across the three case studies and the initial interviews. Specific attention has been paid to the differences between emergency humanitarian responses and developmental efforts, which have been found to be particularly pronounced in the elements of the framework that relate to dynamic complexity. While many themes are linked to discussions within the literature, this study contributes to the existing body of knowledge by expanding upon individual themes and highlighting relationships between them, as well as linking them to underlying generative mechanisms for MSCs.

Based upon the analysis and discussion, a revised conceptual framework for MSCs is presented. While all five of the elements of the initial conceptual framework have been shown to be evident as generative mechanisms in the primary data, the relationships between them differ significantly from the proposed model. Therefore, considerable adjustments have been made. The position of the *Complexity and Interdependency* element has been changed to reflect its overarching importance and the close links it has to each of the other four generative mechanisms. Furthermore, these four have been arranged into a pyramid shape, owing to their visibility as part of the operational context. A split has been illustrated between the behavioural complexity and the dynamic complexity. The latter lies within the accepted remit of SC management and are thus easier to comprehend and manage for the actors within the MSCs. The generative mechanisms related to behavioural complexity have however been demonstrated to display intense interactions with the wider environment that current SC and logistics practices struggle to address sufficiently. When these generative mechanisms have a strong influence, established tools and techniques may fail to be efficient and effective in managing SCs.

In the penultimate section of this chapter, HL has been discussed as an example of a MSC environment. The themes identified in the primary data have been summarised and depicted within the revised conceptual framework, providing an illustration of how these generative mechanisms manifest in the *Empirical* ontological domain according to the critical realist paradigm. While many themes are shared between emergency and

developmental humanitarian responses, there are noticeable differences, particularly in the dynamic complexity part of the framework.

Finally, MSCs have been showcased in a variety of different potential contexts, thus demonstrating the applicability of the framework across a range of SC areas. While an MSC has to exhibit all five generative mechanisms, each will do so to varying degrees with the focus shifting to different generative mechanisms as showcased with the examples discussed. While the body of the SC literature is focussed mainly on the dynamic complexity aspects of the framework, with research areas such as performance measurement and agile SCs clearly tied to these generative mechanisms, MSCs have to be addressed holistically. Ignoring their inherent behavioural complexity will result in unexpected reactions as they represent highly dynamic and adaptable systems. Any approaches to managing MSCs can only ever be partial if they do not take all five generative mechanisms into account. Even with holistic approaches, it needs to be noted that MSCs will always remain complex and interdependent. Generative mechanisms are not eliminated through appropriate management; they are merely addressed.

6 Conclusion

This chapter concludes the thesis by summarising the research conducted and detailing how the work presented in earlier chapters addresses each of the five research objectives that were introduced in Chapter 1. Furthermore, this final chapter provides a discussion of both the academic contribution and the practical implications of the research. Limitations of the research are also considered. Finally, directions for future research that arise from the work presented in this thesis are outlined.

6.1 Thesis Summary

The purpose of this thesis was to contribute to the improved management and design of non-standard SCs, as well as to develop a framework that enables further research to be conducted in a structured way. Whilst a general theory of wicked and messy problems is in existence, this had not previously been applied in a SC context. This thesis has presented an investigation of non-standard SCs in HL through the application of the concept of messy problems to SC management. Based on literature on "wicked" (Rittel and Webber 2007) or "messy" problems (Ackoff 1981), as well as CAS (Choi et al. 2001, Surana et al. 2005, Pathak et al. 2007) a conceptual framework for non-standard SCs was developed. This framework was subsequently explored in the context of HL, but further potential applications in different contexts such as military SCs and events SCs have also been highlighted.

First, a comprehensive literature review was conducted to establish the concept of MSCs based on extant literature. This drew upon literature in fields related to SC management, as well as a wide variety of other disciplines that had developed understandings of messy problems and wicked problems, as well as literature on CAS. While CAS have previously been utilised in SC management, there is no body of literature taking into account wicked and messy problems in logistics and SC management. Criteria for MSCs were therefore drawn up linking the concepts established in other areas to SCs, to ultimately be used to develop an initial conceptual framework.

In addition, a detailed background to the research context of HL as presented in extant literature was provided. HL offers a unique operational context for SC management, and the circumstances and challenges of it were exposed in this part of the literature review. Both academic and professional interest in HL has grown significantly in recent years, reflecting an increase in the frequency and magnitude of disasters in terms of the number of people affected and the economic impact on affected regions. It

has previously been suggested that HL presents a "wicked" problem (Tatham and Houghton 2011), making this context a promising application for the developed conceptual framework for MSCs.

This thesis aimed to develop a conceptual framework for the management of non-standard SCs, based upon the concepts of wicked and messy problems and CAS, and to explore it in a HL context. A conceptual framework was developed taking into account previous studies in related subject areas, broader considerations of research paradigms and approaches, as well as the data needed to address this particular research aim. The research paradigm chosen for this thesis was critical realism, thus employing a realist epistemology and a stratified ontology that differentiates between the empirical, actual, and real domain. All three are explored within the research utilising a RRREI research approach to enable the identification of underlying generative mechanisms in MSCs as exemplified by HL.

Subsequently, primary data was collected in the form of semi-structured interviews in one round of initial interviews, as well as three case studies with the unit of analysis being the humanitarian response. A casing approach was employed, and three case studies were developed:

- Emergency Response to the January 2010 Haiti Earthquake
- Emergency Response to the July 2010 Pakistan Floods
- Developmental Humanitarian Response to Multiple Disasters in Sub-Saharan Africa from 2000 onwards

44 semi-structured interviews with individuals involved in humanitarian responses as part of non-profit or governmental organisations represent the *Empirical* domain, corresponding to the *Resolution* stage of RRREI abductive reasoning (Rotaru et al. 2014). The case study approach provided strong emic information.

Enabled by the use of the NVivo software, a case-by-case analysis of empirical research findings was presented and cross-case analysis and discussion was provided. *Redescription,* the second stage of RRREI was conducted by representing the empirical data through the prism of "wicked" (Rittel and Webber 1973) or "messy" problems (Ackoff 1981) as a theoretical lens to enhance the understanding of the factors that affect the applicability of standard management approaches and the outcomes they elicit, thus moving into the *Actual* domain of critical realism (Rotaru et al. 2014). The thesis utilised an abductive or retroductive mode of reasoning to link the three empirical domains (Danermark et al. 2002, Downward and Mearman 2007, Rotaru et al. 2014). Through the stages of *Retroduction, Elimination,* and *Identification*, ultimately, all five

of the proposed generative mechanisms have been confirmed to be valid within MSCs. However, the interactions between them differ significantly from those sketched in the initial framework.

Therefore, a revised conceptual framework has been presented. The *Complexity and Interdependency* element is shown to encompass the remaining four generative mechanisms, which in turn are arranged in a pyramid shape, ordered according to their visibility in the SCs and the interactions between the elements of the framework. It has been highlighted that whereas dynamic complexity is widely acknowledged and managed within SC literature and practice, behavioural complexity is more difficult to comprehend and thus manage for the actors within a MSC. The generative mechanisms related to behavioural complexity have, however, been demonstrated to display intense interactions with the wider environment that current SC and logistics practices struggle to address sufficiently. When these generative mechanisms have a strong influence, established tools and techniques may fail to be efficient and effective in managing SCs. While this study has focussed on HL, the conceptual framework has the potential to be applied more widely and first evaluations of its usability in other contexts, such as military SCs or events SCs have also been highlighted.

6.2 Key Findings

The main aim of this thesis, as stated in Chapter 1, was to develop a conceptual framework for the management of non-standard SCs, based upon the concepts of wicked and messy problems and CAS, and to explore it in a HL context. This research has introduced a framework for the newly developed concept of MSCs, which has subsequently been refined based upon primary research findings in the area of HL. In line with this main research aim, five research objectives were introduced in Chapter 1. These research objectives are addressed individually in this section.

1. To investigate the characteristics of non-standard SCs with a particular focus on HL.

Conventionally, SCs are depicted as linear connections including the flow of materials, information and money through several tiers of suppliers to a focal company and on to customers, until they ultimately reach the end consumer (Mentzer et al. 2001, Mangan et al. 2008, Waters 2009, Chopra and Meindl 2010, Harrison and Van Hoek 2011). Much of the growing body of SC management literature concentrates on SCs with mature attributes, such as stable organisational structures, a certain level of

predictability, and agreement on the aims of a SC, as well as the acceptable ways of achieving those aims. SCs with less mature operating characteristics receive less attention. It has been suggested that HL presents a "wicked" problem (Tatham and Houghton 2011). This is explored in more depth in Chapter 2 of this work.

Starting out with a review of literature on definitions and understandings of SCs and related concept, non-standard SCs are investigated in more detail. While there are various typologies of different SC types evident in the literature, they do not sufficiently capture the complexity evident in certain SCs. Whilst a general theory of wicked and messy problems is in existence, this has previously not been applied in a SC context. To add to the body of knowledge in regards to non-standard SCs, literature on HL was analysed through the lens of wicked and messy problems, including influences from CAS literature, a related concept that has been applied in a SC context previously.

2. To develop a conceptual framework for management of non-standard SCs.

As a result of this study, a conceptual framework was developed that enables a better understanding of the circumstances that cause limited success in the adaption of commercial SC practice to the HL context by exposing the underlying generative mechanisms. Based on literature on "wicked" (Rittel and Webber 2007) or "messy" problems (Ackoff 1981) a conceptual framework has been developed, identifying five "wicked" or "messy" characteristics SCs might exhibit, the postulated generative mechanisms. The framework further enhances the understanding of various aspects of the context of HL that lead to the specific conditions that influence the relationship between the application of SC knowledge and the outcomes achieved in the context of humanitarian relief. This thesis provides an alternative theoretical stance on non-standard SCs, building upon previous work such as viewing SCs as CAS (for example Choi et al. 2001, Surana et al. 2005, Pathak et al. 2007).

In the initial conceptual framework (see Figure 37), five elements were identified. The framework consists of two halves, one for elements of behavioural complexity, that is complexity that is linked to social interactions and human behaviour, and the other half for elements of dynamic complexity, which incorporates aspects linked to structural issues. In the middle, linking the two is the fifth element, complexity and interdependency. The five elements of MSCs are:

1. They present complex, interdependent problems (Ackoff 1981, Calton and Payne 2003, Mingers 2006b)

2. They have significant sociopolitical impact (Mintzberg et al. 1976, Mitroff and Mason 1980, Camillus 2008)
3. They are non-routine operations (Lyles and Mitroff 1980, Calton and Payne 2003, Camillus 2008, Baer et al. 2013)
4. They have a multitude of stakeholders with differing sets of values (Wagner 1995, Ackermann 2012, Beattie et al. 2012)
5. They lack optimal solutions derived from quantifiable evaluation (Wagner 1995, Eisenhardt 2000, Carrithers et al. 2008, Lyles 2014)

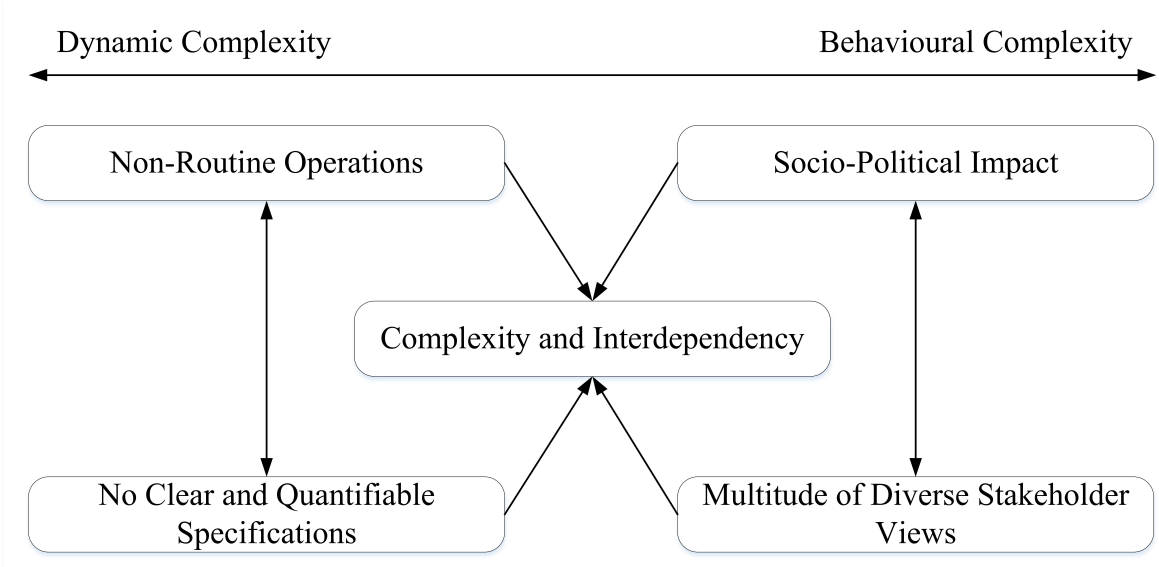


Figure 37: A conceptual framework for messy supply chains (author's own figure)

3. To design and carry out empirical research to explore the proposed conceptual framework in the context of HL.

The proposed conceptual framework developed from the literature was subsequently explored empirically in the context of HL. Chapter 3 detailed the empirical research conducted as part of this thesis, adopting a critical realist approach and collecting primary data through semi-structured interviews organised into an initial round of interviews and three case studies that focus on different humanitarian responses as the unit of analysis. The research is designed to identify underlying generative mechanisms and follows the critical realist RRREI approach, which progresses through the three empirical domains recognised in a critical realist worldview.

Interviewees were involved in humanitarian responses in various capacities, some at the field level, while others were working at headquarters level, with logisticians and

non-logisticians represented. The semi-structured interviews were designed to allow interviewees to comment as they saw fit on issues that make HL a non-standard SC context. The findings were first presented in a case-by-case way in Chapter 4, structured according to the five elements of the proposed conceptual framework. Themes were identified and lead to a cross-case analysis and discussion in Chapter 5, which resulted in a refined conceptual framework to address the subsequent research objective.

Each of the five elements of the proposed conceptual framework was discussed in detail, identifying common themes for each that emerged across the three case studies and the initial interviews. Specific attention was paid to the differences between emergency humanitarian responses and developmental efforts, which were found to be particularly pronounced in the elements of the framework that relate to *Dynamic Complexity*. While many themes were linked to discussions within the literature, this study contributes to the existing body of knowledge by expanding upon individual themes and highlighting relationships between them, as well as linking them to underlying generative mechanisms for MSCs.

4. To refine the proposed conceptual framework based on the empirical research findings.

Based upon the analysis and discussion, thus combining the emic and the etic, a revised conceptual framework for MSCs was presented (see Figure 38). While all five of the elements of the initial conceptual framework were demonstrated to be evident as generative mechanisms within the primary data, the relationships between them differed significantly from the proposed model. Therefore, considerable adjustments were made. The position of the *Complexity and Interdependency* element was adjusted to reflect its overarching importance and the close links it has to each of the other four generative mechanisms. It was moved into a circle, serving as the surroundings for the others. The remaining four generative mechanisms were arranged into a pyramid shape, according to their visibility as part of the operational context. A distinctive split was illustrated between the behavioural complexity and the dynamic complexity. The latter is contained within the accepted remit of SC management and thus appears easier to comprehend and manage for the actors within MSCs. The generative mechanisms related to behavioural complexity have however been demonstrated to display intense interactions with the wider environment that current SC and logistics practices struggle to address sufficiently. When these generative mechanisms have a strong influence, established tools and techniques may fail to be efficient and effective in managing SCs.

The portrayal of the revised conceptual framework presented in Figure 38 provides a more accurate representation of the reality of MSCs, such as the ones under investigation in this study within the context of HL, and thus enhances the understanding of such complex operations. In the future, this improved understanding is anticipated to result in a better assessment of the applicability of existing logistics and SC management knowledge in HL, as well as potentially in other MSC contexts, and to serve as a guideline in the adaption of tools and techniques.

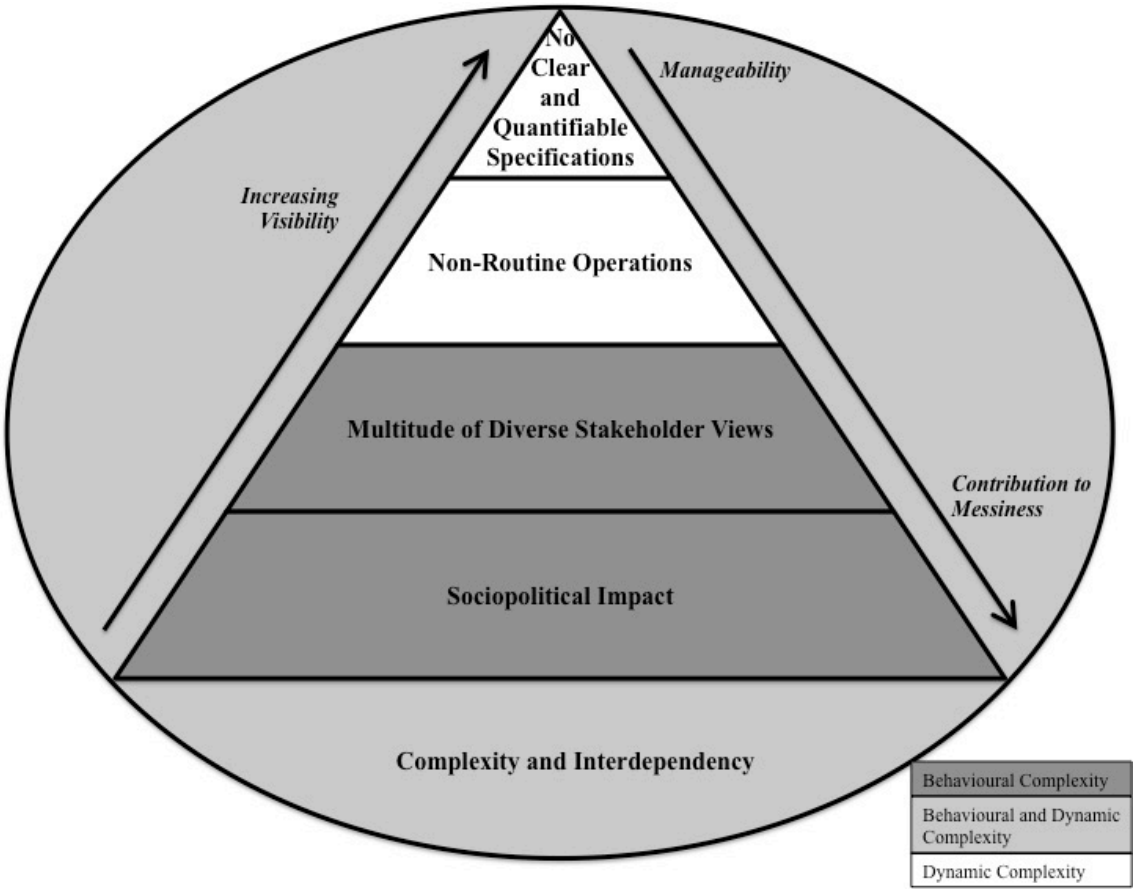


Figure 38: The revised conceptual framework

5. To discuss the applicability of the refined conceptual framework to the management of non-standard SCs.

Through the revised conceptual framework, a better understanding of the unique characteristics of HL as an example of MSCs was achieved. HL was studied in depth in this thesis as one context in which MSCs occur. The prevalence of *Behavioural Complexity* among the generative mechanisms identified as underlying events and behaviour in the Actual empirical domain can explain why approaches and techniques from commercial logistics and SC management are not necessarily successful in the humanitarian context. These insights are expected to contribute to the development of

management approaches that can further improve the efficiency and effectiveness of HL by taking into account all of the generative mechanisms identified in this thesis.

While this study has focussed on HL, the conceptual framework has the potential to be applied more widely and first evaluations of its usability in other contexts, such as military SCs and events SCs were also highlighted. The case studies conducted as part of this research cover various cultural and geographical settings. While some very specific issues might be raised in the primary research, the framework applies to SCs around the world. The framework has applicability in present conditions, but might need to be revised in the future. The consideration of other research contexts, as well as a more general application within the area of HL, lies outside the scope of this research.

While an MSC has to exhibit all five generative mechanisms, each will do so to varying degrees with the focus shifting to different generative mechanisms over time and depending on the operational context. While the body of the SC literature is focussed mainly on the dynamic complexity aspects of the framework, with research areas such as performance measurement and agile SCs clearly tied to these generative mechanisms, MSCs have to be addressed holistically. Ignoring their inherent behavioural complexity will result in unexpected reactions as they represent highly dynamic and adaptable systems. Any approaches to managing MSCs can only ever be partial if they do not take all five generative mechanisms into account. Even with holistic approaches, MSCs will always remain complex and interdependent. Generative mechanisms are not eliminated through appropriate management; they are merely addressed.

6.3 Academic Contribution

Through a comprehensive investigation of non-standard SCs, their conceptualisation based upon extant literature on wicked and messy problems, as well as CAS, and the development of a framework for MSCs, as well as its application in the context of HL, this thesis has made a significant contribution to the logistics and SC management literature, as well as the general body of knowledge. As has been discussed in Chapter 3, much of the growing body of SC management literature concentrates on SCs with mature attributes, such as stable organisational structures, a certain level of predictability, and agreement on the aims of a SC, as well as the acceptable ways of achieving those aims. SCs with less mature operating characteristics receive less attention; although there has been some work applying CAS to SCs (Choi et al. 2001, Surana et al. 2005, Langdon and Sikora 2006, Pathak et al. 2007).

Chapter 2 introduces the terms logistics and SC management and goes on to provide a discussion of non-standard SCs, linking this subject matter to the study of CAS, as well as wicked and messy problems, culminating in the development of the proposed conceptual framework for MSCs. The framework forms the main contribution to knowledge here, as it focuses on a little researched area of SC management. While wicked problems and messy problems have been studied extensively in other areas of social science, and indeed in a business and management context, there is little evidence of the application of these concepts in logistics and SC management. One previous paper suggests that HL presents a "wicked" problem (Tatham and Houghton 2011), but this chapter adds significant depth to this observation, as the second part of the chapter introduces the context of HL, providing suitable definitions and background information based upon existing literature, and views it through the lens of the proposed conceptual framework.

There are several methodological contributions, as highlighted in Chapter 3. Despite the prevalence of the positivistic approach in SC and logistics research, it was decided to adopt the critical realist paradigm to allow for the identification of underlying generative mechanisms and to add depth to the exploration of inherently complex situations that depend significantly on the differing understanding people have of them. Furthermore, a casing approach was adopted in this thesis, which is still a fairly novel approach, which has only recently received attention in the wider area of operations management research (Ragin and Becker 1992, Spring and Santos 2015). Within the area of HL, this thesis adds to the scarce empirical evidence base, particularly by collecting qualitative data. This work contributes to answers to the multiple calls for empirical research in HL (Kovács and Spens 2007, Kovács and Spens 2009, Natarajarathinam et al. 2009, Pettit and Beresford 2009, Pedraza-Martinez et al. 2011), particularly by helping to alleviate the lack of cross-organizational case studies (Kunz and Reiner 2012).

The analysis and discussion provided in Chapters 4 and 5 contribute to knowledge both within HL and of non-standard SCs in general. Within HL, the case studies investigating at the level of humanitarian responses provide a broad evidence base that enables the study of underlying generative mechanisms in a cross-organizational context. The identification of generative mechanisms contributes to a better understanding of HL and the operational context. The framework developed in earlier chapters is explored through the empirical enquiry and adapted based on the research findings. For future research, it provides a structured way to conduct research not solely

in the context of HL, but also in other MSC scenarios, where it can be utilized in studying complex situations.

The revised conceptual framework provides opportunities for further structured investigation, and its application in HL contributes to the understanding of the SCs in this context. Within the academic community, it is intended for use by those working within H, and those working on wider logistics and SC problems. Based on both elements of stakeholder theory and systems thinking, the framework integrates well within the existing academic discourse, but through the application of the concepts of messy and wicked problems in addition to CAS, which has already been utilized in the logistics and SC literature, the framework becomes a new tool in approaching particularly complex SCs. In that it forms part of a growing body of work recognising the increasing importance of human interactions in SCs. The framework provides a foundation for holistic approaches to SCs and their analysis by incorporating five key elements of complexity. It can be used to inform research into diverse aspects of SCs, ensuring a broad foundation that incorporates multiple perspectives and can thus be beneficial in designing and conducting relevant research that does not take a reductionist approach.

Within the academic HL community in particular, the framework is intended to be used as a tool to explore a broad range of aspects that affect HL in any given scenario, although the particular details and weightings of their influence might vary according to the specific context. The framework can serve as a guide to appreciating the full complexity of HL and can provide researchers with a basis for decision making in regards to research directions, as well as in evaluating both intended and unintended consequences of suggestions. Furthermore, the framework's theoretical base can add to the growing theoretical base of HL research.

6.4 Practical Implications

Before this study was conducted, there was a perceived mismatch between common logistics and SC tools and techniques and the HL context. While good results were achieved in some scenarios, this did not hold for all instances (Day et al. 2012). This research has highlighted the strong element of behavioural complexity that underlies HL and other MSCs and is often inadequately addressed by managers and literature alike. The acknowledgement of all the different elements of messiness in HL and other scenarios, as well as the need for holistic management approaches, changes the way in which MSCs are seen. Eventually, drawing on previous work on CAS, as

well as wicked and messy problems, appropriate management that takes into account all of the identified generative mechanisms can be developed based on this initial work.

Behavioural complexity has indeed been appreciated by managers and researchers alike, as evidenced, for example, by the rich body of stakeholder theory and stakeholder management literature (Hill and Jones 1992, Carroll 1993, Atkinson et al. 1997, Mitchell et al. 1997, Agle et al. 1999, Jones and Wicks 1999, Phillips et al. 2003, Co and Barro 2009). Furthermore, social interactions form a key part of systems thinking, in particular soft systems thinking soft (Platt and Warwick 1995, Checkland 1999a, Mingers 2000b, Gencoglu et al. 2002). This thesis, as previously details builds on both traditions. However, this acknowledgement rarely feeds through to other areas of management. One particularly pertinent example lies in the assessment of performance. The primary research has provided evidence of a dichotomy between the two key customer groups in HL, the donors and the beneficiaries, whose views and priorities do not necessarily align (Schiffling and Piecyk 2014). While interviewees expressed a great concern with interactions with the donors and conformance with their ways of assessing performance, there was also a keen awareness that impact assessment on the beneficiaries' side is much more limited. The assessment of performance is thus not actually based on feedback that is most suitable for improvement. The generative mechanisms of *Sociopolitical Impact* and *Multitude of Diverse Stakeholder Views* need to be considered in greater depth.

The conceptual framework developed here is intended to inform managerial decision-making in HL and other potential MSC contexts. The pyramid shape of the revised conceptual framework highlights the importance, in terms of their contribution to messiness, of those elements that tend to be less visible in the SC. It is conceivable that these elements of behavioural complexity are more easily overlooked in SC management in MSC contexts. By taking all five elements of the framework into account, actors in MSCs can make more informed, more holistic decisions and ensure proposed solutions are not likely to have unintended consequences in any of those elements. As the framework is anchored in a body of literature on managing messy and wicked problems, guidelines for managing MSCs could also be developed in the future, which would further increase the usefulness of the framework to actors in MSCs.

While it is beyond the scope of this study to design or implement adequate management responses, some prior work exists in this area and can be seen as illustrative of potential uses of the framework developed here. Applying a management approach rooted in wicked and messy problems to project management, Hancock

(2010) describes performance management in complex projects, such as the construction of London Heathrow's terminal 5. In this scenario, risks and rewards were shared among all of the contractors, thus taking into account many key stakeholders and aligning their incentives in a highly political complex project. While Terminal 5 is now famed as a failure and laughing stock for the mayhem that ensued as soon as it opened, the actual construction project was delivered within the allocated timeframe and budget, and acknowledged to be managed exceedingly well. Hancock (2010) accredits this to the wicked and messy problems approach employed and the holistic thinking it incorporates, taking into account generative mechanisms similar to the ones encapsulated in the framework developed in this work. Another example of practical impact is provided by Haigh (2016) who applied the MSC framework in the context of a Royal Navy spare parts SC. In a very diverse network of stakeholders, the alignment of incentives was identified as a major issue impacting the overall performance of the SC. Behavioural complexity was insufficiently acknowledged in current management approaches. The SC management structure that Haigh (2016) proposes is focused on providing an overall vision and performance measures for the SC, encouraging interactions between entities rather than partial optimization attempts by each actor.

Performance management is only one of the areas that the MSC framework can have an impact on in practice. Managers at the micro-scale, at the level of a particular humanitarian organisation, or one humanitarian mission, can utilize this framework to increase their understanding of their MSC and to develop management practice according to the findings of studying MSCs in a structured way. Such managerial practice necessitates a holistic view of the SC and its environment as has been demonstrated in this thesis. The key contribution of this thesis to practice is to highlight the importance of behavioural complexity in MSCs, an area that is often not addressed sufficiently in conventional SC management. For managers it is essential to acknowledge these elements of the framework presented here, as improvement is not possible through addressing only sub-elements of the framework due to the complexity and interdependency inherent in MSCs. Furthermore, the framework can form a basis for discussion of the variety of views the stakeholders of any MSC are likely to have. As a shared understanding is important in establishing and further developing effective and efficient SCs, the framework can provide humanitarian organisations with a better base for long-term planning and the development of SC strategies.

Some examples of application beyond the context of HL have been provided above. Furthermore, the framework can be beneficial to any SC that suddenly becomes

"messy", for example through significant changes in the external environment that have a major impact on the workings of the system. A recent example of a shock to many global SCs is the Brexit decision in the UK in 2016, a sociopolitical impact on SCs that has resulted in severe uncertainty among stakeholders and added complexity to operations. Considering the various generative mechanisms and the relationships between them can be beneficial to managers adjusting to such a severe change in circumstances that has the potential to cause severe disruption to the SC.

6.5 Trustworthiness of the Research

The efforts undertaken to ensure the trustworthiness of the study were detailed in Chapter 3. Trustworthiness consists of four criteria, namely credibility, transferability, dependability, and confirmability.

Credibility has been achieved through respondent validation, as key informants have been asked to review the draft of the findings and analysis to ensure the correct understanding and interpretation of their views. Comments from these informants have then been integrated into subsequent versions of the corresponding chapters. Due to the abductive research approach, there is a constant iteration between proposed and identified patterns, between theory and empirical data, and in RRREI the Elimination phase deals with competing generative mechanisms to make sense of the data, thus adding to credibility.

Transferability is not equivalent to generalizability as in the sense of quantitative studies and thus there has been no random sampling or a claim of generalizable findings. The approach taken here is to focus on the contextual uniqueness of the cases studied, but aiming to produce thick description, a detailed account of the cases that can enable researchers to make an informed judgment about the possible transferability of findings to other contexts. This is achieved through an extensive and detailed findings chapter that expresses the richness of the primary data and a detailed understanding of the cases.

Dependability is achieved here by maintaining a case study database, through the electronic storage of all data and notes that clearly document the research process and thus would allow future researchers to repeat the analytical procedures. The case study protocol includes the interview guide, as well as the procedures to be followed in using it. Despite the accurate record keeping, there has been no auditing process in place as only one researcher was involved in this research.

Confirmability is achieved by maintaining a case study database, through the electronic storage of all data and notes that clearly document the research process and thus would allow future researchers to follow the logic of the analytical procedures. Furthermore, a case study protocol has been developed including the interview guide, as well as the procedures to be followed in using it. The review of drafts by key informants is also seen to have contributed to a reduction of bias and to confirm that research was conducted in good faith.

6.6 Limitations of the Research

Even though this research was designed and executed with the utmost concern for trustworthiness, every piece of research is inevitably conducted within certain constraints. Therefore these constraints suggest some limitations to the study and these potential limitations are discussed here.

The most significant limitations lie in the primary data collected. The sample of 44 interviews is relatively small, which constrains the variety of different opinions gathered. In particular, only actors at humanitarian organisations have been interviewed. This is due to the nature of humanitarian work where it can be difficult to reach entities within the HL system without access to the areas in which certain humanitarian responses occur. Especially given the importance of the multitude of stakeholders that emerged in the primary data, only including actors from humanitarian organisations in the sample represents a crucial limitation. No beneficiaries, political decision makers, commercial suppliers, media representatives, or other stakeholders have been included in the sample. These stakeholders might have significantly different views from those captured in this study. While such stakeholders might have limited direct involvement in the SC, it became apparent in the primary research that their influence is still considerable. To gain such complete access was impossible as part of this study.

Each case study includes a limited number of interviews. While care was taken to represent different organisations and different actors within those organisations, these interviews cannot claim to provide a truly complete picture of the humanitarian responses, given that not every humanitarian organisation, or even a representative sample of organisations was included in the sample. The majority of respondents were from large organisations, which might present a bias, as many also expressed a critical attitude towards smaller, and often newer, humanitarian organisations. Smaller organisation represented in the research gave some indication of being more flexible and proactive, for example in their extensive use of social media. Despites effort for

gender balance in the sample, it did not prove possible to find a single female logistician willing to be interviewed for this study. While women in non-logistics roles were interviewed, every interviewee who identified as a logistician was male.

The selection of the case studies presents a further limitation. Only three case studies were developed as part of this thesis, which cannot be seen to be representative of the entirety of HL. While different geographical and cultural contexts were represented, as well as emergency and developmental responses, the coverage is by no means complete. All three case studies were situated in developing countries with the inherent underlying issues such as poor infrastructure. Case studies on humanitarian responses in developed countries are likely to differ significantly.

The two emergency response case studies both have strict spatial and temporal boundaries that suggest a certain degree of comparability. However, the Africa case study does not follow the same logic, which weakens the overall research design. There is a variety of individual disasters included in both the geography and timeframe that the Africa case study covers. Given a larger number of responses, the Africa case study could have been broken up into smaller case studies that, while maintaining the developmental focus and slow-onset disaster coverage desired, are more similar to the two emergency case studies. One potential example could have been the 2011 famine in Somalia, which was part of a drought that caused a severe food crisis across Somalia, Djibouti, Ethiopia and Kenya. With the focus on the UN's famine declaration in Somalia, there would have been a clearly defined disaster to trigger a humanitarian response, albeit within an overall developmental context. Similarly, a number of other distinct disasters could have formed separate case studies. This was not realised here because of a lack of access to interviewees in any particular African disaster response, instead amalgamating several disasters into one case study. While this was a pragmatic approach given the time and resource constraints of this thesis, the resulting Sub-Saharan Africa case study lacks comparability to the two emergency response case studies. While this research does not aim for generalizability, the analysis of such different cases within one analysis and discussion chapter creates difficulties. The intention here was to provide examples of a variety of HL contexts, highlighting a variety of operational backgrounds and their respective challenges. Further work is needed to provide a comprehensive overview and to apply the conceptual framework in a range of different responses that follow a more consistent logic in the research design.

The case studies were developed through a casing approach depending on opinions expressed by respondents in the initial round of interviews as to which

humanitarian responses would represent diverse and interesting case studies. There could be an inherent bias expressed here as respondents were drawing on their own knowledge and experience of HL to make these recommendations. Furthermore, some of the respondents were contacted through referrals from previous interviews using snowball sampling, which has potential to cause a bias towards like-minded individuals and in some cases included multiple respondents from one humanitarian organisations, which might skew findings towards particular organisational cultures.

6.7 Directions for Future Research

This thesis has developed and explored a framework for MSCs that is proposed as a foundation for future research attempting to tackle the challenges of such non-standard SCs. The MSC framework stipulates a need for more holistic management approaches with a particular focus on the behavioural complexity part of MSCs. This has an impact on both research and management practice, which needs to encapsulate these aspects and integrate them in logistics and SC management. The framework provides a structure for analysis and enhances understanding of the various interconnected aspects that make such SCs so difficult to analyse and to manage in practice. This thesis provides an exploratory study and initial mapping of the terrain, but further research is required to ascertain the detailed topography of the complex systems that MSCs represent. The framework can now be employed in specific instances of MSCs for further refinement.

Future work could apply the framework developed here in different MSC contexts. Some examples of suitable contexts have already been provided. While this thesis focused on HL, several other potentially suitable areas of application have been outlined at the end of the previous chapter, such as military SCs and events SCs. Further studies should aim to explore the different parts of the framework in other contexts through both primary and secondary research. While it is proposed that the framework is consistent across various MSC contexts, there are likely to be distinct differences among different settings, which need to be explored further. Empirical work could be undertaken in a variety of ways. Initially, qualitative research provides more promising approaches to enhance understanding of the interplay of the various factors of MSCs, but once this foundation is established, particular issues can be pinpointed and assessed with a mixture of qualitative and quantitative research.

Furthermore, a taxonomy of different types of MSCs could be developed through future work. As has been discussed previously, while all elements of the framework are

present in a MSC, the weighting can differ between contexts, or even among stakeholders within the same MSC. Building on these findings, various MSCs could be mapped and ultimately, a tool could be developed to aid stakeholders in conversations to enhance understanding of their MSC and thus enable discussion of suitable new management approaches. This could be achieved through approaches that value the viewpoints of individuals, for example Q methodology, a form of factor analysis originating in psychology, but used increasingly across social sciences (Watts and Stenner 2012).

Within the context of HL, such a taxonomy could be achieved through further work. It would also be of interest to researchers to expand the use of the framework in this context. Ultimately, the framework should form the basis of more holistic approaches to managing HL, which acknowledge the inherent complexity and interdependency of such MSCs, and primarily target the layers of behavioural complexity that are so crucial to their management. This can be achieved through more in depth work within particular organisations or in certain humanitarian responses. Even with the primary data collected here, further analysis can be conducted. The data could be analysed according to gender, job description, position, organisation size to gain insights into differences that arise from these variables. Aspects of this have been mentioned in the present data analysis, in particular regarding the dichotomy between different organisational levels within humanitarian organisations, and the size of organisations, mainly larger organisations being critical of the involvement and expertise of smaller ones. However, these themes have not been developed further at present as the focus lay on larger issues and commonalities. This thesis has provided broader background work that can now be applied in specific instances for further refinement.

6.8 Summary

The present Chapter concludes the thesis by summarising the whole work and highlighting the key findings. Particular attention is paid to the contribution this research has made to the academic body of knowledge, as well as to managerial practice in the area of SC management. Furthermore, limitations of this work were recognised. Finally, directions for further research based upon this thesis were identified.

MSC encounter significant difficulties that might inhibit the application of conventional SC and logistics management tools and techniques. This happens because they are focused primarily on aspects of dynamic complexity, whereas in MSCs the

behavioural complexity plays a very significant role, contributing majorly to the inherent complexity and interdependency, which stipulates that solutions cannot be found by only focusing on certain aspects of MSCs. Holistic approaches are essential in tackling MSCs in research, as well as in managerial practice. The primary research in HL demonstrated a significance of the multitude of diverse stakeholder views and the sociopolitical impact for the establishment and management of SCs in the context of humanitarian operations. These are both generative mechanisms that depict behavioural complexity. While dynamic complexity is addressed in manifold logistics and SC publications, behavioural complexity engenders issues that are not sufficiently tackled within the extant literature. Therefore this thesis offers a way to structure further research into MSCs, thus contributing to the body of knowledge in the area of SC management, as well as offering practical messages for managers.

7 References

Aastrup, J. and Halldórsson, Á. (2008) 'Epistemological role of case studies in logistics: A critical realist perspective', *International Journal of Physical Distribution & Logistics Management,* 38(10), 746-763.

Abidi, H., de Leeuw, S. and Klumpp, M. (2013) 'Measuring success in humanitarian supply chains', *International Journal of Business and Management Invention,* 2(8), 31-39.

Abidi, H., Leeuw, S. d. and Klumpp, M. (2015) 'The value of fourth-party logistics services in the humanitarian supply chain', *Journal of Humanitarian Logistics & Supply Chain Management,* 5(1), 35-61.

Ackermann, F. (2011) 'Getting 'messy' with problems: the challenges of teaching 'soft' OR', *INFORMS Transactions on Education,* 12(1), 55-64.

Ackermann, F. (2012) 'Problem structuring methods 'in the Dock': Arguing the case for Soft OR', *European Journal of Operational Research,* (3), 652-658.

Ackoff, R. L. (1979) 'The Future of Operational Research is Past', *The Journal of the Operational Research Society,* 30(2), 93-104.

Ackoff, R. L. (1981) 'The art and science of mess management', *Interfaces,* 11(1), 20-26.

Ackoff, R. L. (1987) 'Presidents' symposium: OR, a post mortem', *Operations Research,* 35(3), 471-474.

Adamides, E. D., Papachristos, G. and Pomonis, N. (2012) 'Critical realism in supply chain research: Understanding the dynamics of a seasonal goods supply chain', *International Journal of Physical Distribution and Logistics Management,* 42(10), 906-930.

Agle, B. R., Mitchell, R. K. and Sonnenfeld, J. A. (1999) 'Who matters to managers? An investigation of stakeholder attributes and salience, corporate performance, and manager values', *The Academy of Management Journal,* 42(5), 507-525.

Aiken, J., Childerhouse, P. and Towill, D. (2003) 'The Impact of Product Life Cycle on Supply Chain Strategy', *International Journal of Production Economics,* 85(2), 127-140.

Albert, R. (2005) 'Scale-free networks in cell biology', *Journal of Cell Science,* 118(21), 4947-4957.

Alexander, A., Walker, H. and Naim, M. (2014) 'Decision theory in sustainable supply chain management: a literature review', *Supply Chain Management: An International Journal,* 19(5/6), 504 – 522.

Altay, N. and Green, W. G. (2006) 'Interfaces with other disciplines: OR/MS research in disaster operations management', *European Journal of Operational Research,* 175, 475-493.

Altay, N., Prasad, S. and Sounderpandian, J. (2009) 'Strategic planning for disaster relief logistics: lessons from supply chain management', *International Journal of Services Sciences,* 2(2), 142-161.

Alvarez-Gil, J., Berrone, P., Husillos, F. J. and Lado, N. (2007) 'Reverse logistics, stakeholders' influence, organizational slack, and managers' posture', *Journal of Business Research,* 60(5), 463-473.

Anner, M. (2012) 'Corporate social responsibility and freedom of association rights: The precarious quest for legitimacy and control in global supply chains', *Politics & Society,* 40(4), 609-644.

Anonymous (2013) 'Logistics Operational Guide', [online], available: http://log.logcluster.org/preparedness/logistics/index.html [Accessed 22.01 2013].

Anttila, U. M. A. (2014) 'Human security and learning in crisis management', *Journal of Humanitarian Logistics & Supply Chain Management,* 4(1), 82-95.

Apte, A. (2009) *Humanitarian logistics: a new field of research and action, Foundations and Trends in Technology, Information and OM,* Hanover, Mass.

Apte, A., Gonçalves, P. and Yoho, K. (2016) 'Capabilities and competencies in humanitarian operations', *Journal of Humanitarian Logistics & Supply Chain Management,* 6(2), 240-259.

Apte, A. and Yoho, K. (2011) *Strategies for Logistics in Case of a Natural Disaster*, Calhoun: The NPS Institutional Archive, Monterey, California.

Ashby, W. R. (1963) *An Introduction to Cybernetics,* New York, NY: Wiley.

Atkinson, A. A., Waterhouse, J. H. and Wells, R. B. (1997) 'A stakeholder approach to strategic performance measurement', *Sloan Management Review,* 38(3), 25-37.

Auton, B. (2006) 'Humanitarian & emergency logistics professionals', *Logistics & Transport Focus,* 8(2), 14-17.

Baer, M., Dirks, K. T. and Nickerson, J. A. (2013) 'Microfoundations of strategic problem formulation', *Strategic Management Journal,* 34(2), 197-214.

Balcik, B., Beamon, B. M., Krejci, C. C., Muramatsu, K. M. and Ramirez, M. (2010) 'Coordination in humanitarian relief chains: Practices, challenges and opportunities', *International Journal of Production Economics,* 126(1), 22-34.

Ballou, R. H. (2007) 'The evolution and future of logistics and supply chain management', *European Business Review,* 19(4), 332-348.

Baltacioglu, T., Ada, E., Kaplan, M. D., Yurt, O. and Kaplan, Y. C. (2007) 'A new framework for service supply chains', *Service Industries Journal,* 27(2), 105-124.

Banomyong, R. and Sopadang, A. (2010) 'Using Monte Carlo simulation to refine emergency logistics response models: a case study', *International Journal of Physical Distribution & Logistics Management,* 40(8-9), 709-721.

Barr, A. and Fafchamps, M. (2006) 'A client-community assessment of the NGO sector in Uganda', *Journal of Development Studies,* 42(4), 611-639.

Barratt, M., Choi, T. Y. and Li, M. (2011) 'Qualitative case studies in operations management: Trends, research outcomes, and future research implications', *Journal of Operations Management,* 29(4), 329-342.

Batie, S. (2008) 'Wicked problems and applied economics', *American Journal of Agricultural Economics,* 90(5), 1176-1190.

Bealt, J., Fernández Barrera, J. C. and Mansouri, S. A. (2016) 'Collaborative relationships between logistics service providers and humanitarian organizations during disaster relief operations', *Journal of Humanitarian Logistics & Supply Chain Management,* 6(2), 118-145.

Beamon, B. M. and Balcik, B. (2008) 'Performance measurement in humanitarian relief chains', *International Journal of Public Sector Management,* 21(1), 4-25.

Beattie, V., Fearnley, S. and Hines, T. (2012) 'A real-life case study of audit interactions—Resolving messy, complex problems', *Accounting Education,* 21(2), 111-129.

Ben-Tal, A., Chung, B. D., Mandala, S. R. and Yao, T. (2011) 'Robust optimization for emergency logistics planning: Risk mitigation in humanitarian relief supply chains', *Transportation Research Part B: Methodological,* 45(8), 1177-1189.

Bennett, N. and Lemoine, J. (2014) 'What VUCA really means for you', *Harvard Business Review,* 92(1/2), 27.

Beresford, A. K. C. and Rugamba, A. (1996) *Evaluation of the Transport Sector in Rwanda*, Geneva: UNCTAD.

Bharosa, N., Lee, J. and Janssen, M. (2010) 'Challenges and obstacles in sharing and coordinating information during multi-agency disaster response: Propositions from field exercises', *Information Systems Frontiers,* 12(1), 49-65.

Bhaskar, R. (1975) *A Realist Theory of Science,* Leeds: Routledge.

Bhaskar, R. (1989) *The Possibility of Naturalism: A Philosophical Critique of the Contemporary Human Sciences,* 2nd ed.*,* New York, NY: Harvester Wheatsheaf.

Bhaskar, R. (1994) *Plato etc.: The Problems of Philosophy and Their Resolution,* London: Verso.

Bhaskar, R. (1997) 'On the ontological status of ideas', *Journal for the Theory of Social Behaviour,* 27(2-3), 139-147.

Bhaskar, R. (2012) *Reflections on Metareality: Transcendence, Emancipation and Everyday Life, Classical texts in critical realism,* New York, NY: Routledge.

Bilodeau, M. and Slivinski, A. (1997) 'Rival Charities', *Journal of Public Economics,* 66(3), 449-467.

Blaikie, N. (2004) 'Paradigm' in Lewis-Beck, M. S., Bryman, A. and Futing Liao, T., eds., *The Sage Encyclopedia of Social Science Research Methods*, London: SAGE, 786-788.

Blecken, A. (2010) 'Supply chain process modelling for humanitarian organizations', *International Journal of Physical Distribution & Logistics Management,* 40(8-9), 675-692.

Boland, T. and Fowler, A. (2000) 'A systems perspective of performance management in public sector organisations', *International Journal of Public Sector Management,* 13(5), 417-446.

Bowersox, D. J. and Closs, D. J. (1996) *Logistical Management: The Integrated Supply Chain Process,* Singapore: McGraw-Hill.

Boyer, K. and Swink, M. (2008) 'Editorial: Empirical elephants : why multiple methods are essential to quality research in operations and supply chain management', *Journal of operations management,* 26(3), 338-344.

Bozkurt, M. and Duran, S. (2012) 'Effects of natural disaster trends: A case study for expanding the pre-positioning network of CARE International', *International Journal of Environmental Research and Public Health,* 9(8), 2863-2874.

Bozorgi-Amiri, A., Jabalameli, M. S. and Mirzapour Al-e-Hashem, S. M. J. (2013) 'A multi-objective robust stochastic programming model for disaster relief logistics under uncertainty', *OR Spectrum,* 35(4), 905-933.

Brannick, T. and Coghlan, D. (2007) 'In defense of being "native": The case for insider academic research', *Organizational Research Methods,* 10(1), 59-74.

Brownlee, J. (2007) *Complex Adaptive Systems*, Melbourne: Complex Intelligent Systems Laboratory, Centre for Information Technology Research, Faculty of Information Communication Technology, Swinburne University of Technology.

Bryman, A. (2012) *Social Research Methods,* 4th ed.*,* Oxford: Oxford University Press.

Bryman, A. and Bell, E. (2007) *Business Research Methods,* 2nd ed.*,* Oxford: Oxford University Press.

Buckmaster, N. (1999) 'Associations between outcome measurement, accountability and learning for non-profit organisations', *International Journal of Public Sector Management,* 12(2), 186-197.

Burgess, K., Singh, P. J. and Koroglu, R. (2006) 'Supply chain management: a structured literature review and implications for future research', *International Journal of Operations & Production Management,* 26(7), 703 - 729.

Burgess, R. G. (1984) *In the Field: An Introduction to Field Research,* London: Allen & Unwin.

Burrell, G. and Morgan, G. (1979) *Sociological Paradigms and Organisational Analysis : Elements of the Sociology of Corporate Life,* London: Heinemann Educational Books.

Buysse, K. and Verbeke, A. (2005) 'Proactive Environmental Strategies: A Stakeholder Management Perspective' in Rugman, A. M. and Verbeke, A., eds., *Analysis of Multinational Strategic Management*, Cheltenham, UK, 327-344.

Calton, J. M. and Payne, S. L. (2003) 'Coping with paradox: multistakeholder learning dialogue as a pluralist sensemaking process for addressing messy problems', *Business & Society,* 42(1), 7-42.

Camillus, J. C. (2008) 'Strategy as a Wicked Problem', *Harvard Business Review,* 86(5), 98-106.

Capie, D. (2015) 'The United States and Humanitarian Assistance and Disaster Relief (HADR) in East Asia: Connecting coercive and non-coercive uses of military power', *Journal of Strategic Studies,* 38(3), 309-331.

Capra, F. (1996) *The Web of Life: A New Scientific Understanding of Living Systems,* New York, NY: Anchor Books.

Carr, L. J. (1932) 'Disaster and the Sequence-Pattern Concept of Social Change', *American Journal of Sociology,* 38(2), 207-218.

Carrithers, D., Ling, T. and Bean, J. C. (2008) 'Messy problems and lay audiences : teaching critical thinking within the finance curriculum', *Business Communication Quarterly: A Publication of the Association for Business Communication,* 71(2), 152-170.

Carroll, A. and Neu, J. (2009) 'Volatility, unpredictability and asymmetry: An organising framework for humanitarian logistics operations?', *Management Research News,* 32(11), 1024-1037.

Carroll, A. B. (1993) *Business and Society: Ethics and Stakeholder Management,* 2nd ed.*,* Cincinnati: South-Western Publishing Co.

Carson, D., Gilmore, A., Perry, C. and Gronhaugh, K. (2001) *Qualitative Marketing Research,* London: Sage.

Carter, C. R. and Ellram, L. M. (2003) 'Thirty-Five Years of The Journal of Supply Chain Management: Where Have We Been and Where are We Going?', *Journal of Supply Chain Management,* 39(2), 27-39.

Carter, C. R., Ellram, L. M. and Kaufmann, L. (2008) 'From the editors: New directions for JSCM', *Journal of Supply Chain Management,* 44(1), 5-9.

Chandes, J. and Pache, G. (2010) 'Investigating humanitarian logistics issues: From operations management to strategic action', *Journal of Manufacturing Technology Management,* 21(3), 320-340.

Charles, A., Lauras, M. and Van Wassenhove, L. (2010) 'A model to define and assess the agility of supply chains: building on humanitarian experience', *International Journal of Physical Distribution and Logistics Management,* 40(8-9), 722-741.

Checkland, P. (1981) *Systems thinking, systems practice,* Wiley, 1981.

Checkland, P. (1983) 'O.R. and the systems movement: Mappings and conflicts', *The Journal of the Operational Research Society,* 34(8), 661-675.

Checkland, P. (1999a) *Soft Systems Methodology: A 30-Year Retrospective; and, Systems Thinking, Systems Practice,* Chichester: Wiley.

Checkland, P. (1999b) *Systems Thinking, Systems Practice: Includes a 30-Year Retrospective,* Chichester: Wiley.

Checkland, P. and Scholes, J. (1990) *Soft Systems Methodology in Action,* Chichester: Wiley.

Chen, I. and Paulraj, A. (2004) 'Towards a theory of supply chain management: the constructs and measurements', *Journal of Operations Management,* 22(2), 119-150.

Chicksand, D., Watson, G., Walker, H., Radnor, Z. and Johnston, R. (2012) 'Theoretical perspectives in purchasing and supply chain management: an analysis of the literature', *Supply Chain Management: An International Journal,* 17(4), 454-472.

Choi, T. Y., Dooley, K. J. and Rungtusanatham, M. (2001) 'Supply networks and complex adaptive systems: Control versus emergence', *Journal of Operations Management,* 19(3), 351-366.

Choi, T. Y. and Hong, Y. (2002) 'Unveiling the structure of supply networks: case studies in Honda, Acura, and Daimler Chrysler', *Journal of Operations Management,* 20(5), 469-493.

Chopra, S. and Meindl, P. (2010) *Supply Chain Management: Strategy, Planning and Operation,* 4th ed.*,* New York, NY: Prentice Hall.

Christopher, M. (1992) *Logistics and Supply Chain Management: Strategies for Reducing Costs and Improving Services,* London: Financial Times, Pitman Publishing.

Christopher, M. (2000) 'The agile supply chain - Competing in volatile markets', *Industrial Marketing Management,* 29(1), 37-44.

Christopher, M. (2005) *Logistics and Supply Chain Management: Creating Value-Adding Networks,* Harlow: Financial Times Prentice Hall.

Christopher, M. and Holweg, M. (2011) 'Supply Chain 2.0: managing supply chains in the era of turbulence', *International Journal of Physical Distribution & Logistics Management,* 41(1), 63 - 82.

Christopher, M. and Peck, H. (2004) 'Building the Resilient Supply Chain', *International Journal of Logistics Management,* 15(2), 1-14.

Christopher, M., Peck, H. and Towill, D. (2006) 'A taxonomy for selecting global supply chain strategies', *International Journal of Logistics Management,* 17(2), 277-288.

Churchman, C. W. (1967) 'Wicked Problems', *Management Science,* 14(4), B141-B142.

Co, H. C. and Barro, F. (2009) 'Stakeholder theory and dynamics in supply chain collaboration', *International Journal of Operations & Production Management,* 29(6), 2-2.

Collier, A. (1994) *Critical Realism: An Introduction to Roy Bhaskar's Philosophy,* London: Verso.

Collis, J. and Hussey, R. (2003) *Business Research: A Practical Guide for Undergraduate and Postgraduate Students,* 2nd ed.*,* Basingstoke: Palgrave Macmillan.

Cooper, M. C., Lambert, D. M. and Pagh, J. D. (1997) 'Supply Chain Management: More Than a New Name for Logistics', *International Journal of Logistics Management,* 8(1), 1-14.

Corbett, C. J. and Van Wassenhove, L. N. (1993) 'The natural drift: what happened to operations research?', *OR Forum,* 41(4), 625-640.

Corbin, J. and Strauss, A. (2008) *Basics of qualitative research : techniques and procedures for developing grounded theory,* Thousand Oaks, CA: Sage Publications Inc.

Coyle, J. J., Bardi, E. J. and Langley, C. J. (1996) *The Management of Business Logistics,* 6th ed.*,* Minneapolis, MN: South-Western/Thomson Learning.

Cozzolino, A. (2012) *Humanitarian Logistics Cross-Sector Cooperation in Disaster Relief Management,* Berlin, Germany: Springer Science & Business Media.

Craighead, C. W., Hanna, J. B., Gibson, B. J. and Meredith, J. R. (2007) 'Research approaches in logistics Trends and alternative future directions', *International Journal of Logistics Management,* 18(1), 22-40.

Creswell, J. W. (2014) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches,* 4th ed.*,* Los Angeles, CA: Sage.

Croom, S., Romano, P. and Giannakis, M. (2000) 'Supply chain management: an analytical framework for critical literature review', *European Journal of Purchasing and Supply Management,* 6, 67-83.

Cross, T. (2011) 'Disaster agencies and military forces not such strange bedfellows after all' in Christoper, M. and Tatham, P., eds., *Humanitarian Logistics Meeting the Challenges of Preparing for and Responding to Disasters*, London, UK: Kogan Page Limited, 234-248.

Crotty, M. (1998) *The Foundations of Social Research: Meaning and Perspective in the Research Process,* Thousand Oaks, CA: Sage.

Cruz, J. M. (2013) 'Mitigating global supply chain risks through corporate social responsibility', *International Journal of Production Research,* 51(13), 3995-4010.

D'Haene, C., Verlinde, S. and Macharis, C. (2015) 'Measuring while moving (humanitarian supply chain performance measurement – status of research and current practice)', *Journal of Humanitarian Logistics & Supply Chain Management,* 5(2), 146-162.

Dane, F. C. (1990) *Research Methods,* Pacific Grove, CA: Brooks/Cole.

Danermark, B., Ekstrom, M., Jakobsen, L. and Karlsson, J. C. (2002) *Explaining Society: Critical Realism in the Social Sciences,* London/New York, NY: Routledge.

Davidson, A. L. (2007) *Key performance indicators in humanitarian logistics*, unpublished thesis Massachusetts Institute of Technology.

Day, J. M. (2014) 'Fostering emergent resilience: The complex adaptive supply network of disaster relief', *International Journal of Production Research,* 52(7), 1970-1988.

Day, J. M., Junglas, I. and Silva, L. (2009) 'Information Flow Impediments in Disaster Relief Supply Chains', *Journal of the Association for Information Systems,* 10(8), 637-660.

Day, J. M., Melnyk, S. A., Larson, P. D., Davis, E. W. and Whybark, D. C. (2012) 'Humanitarian and disaster relief supply chains: A matter of life and death', *Journal of Supply Chain Management,* 48(2), 21-36.

de Leeuw, S. (2010) 'Towards a Reference Mission Map for Performance Measurement in Humanitarian Supply Chains', in Camarinha-Matos, L. M., Boucher, X. and Afsarmanesh , H., eds., *Collaborative Networks for a Sustainable World: 11th IFIP WG 5. 5 Working Conference on Virtual Enterprises, PRO-VE 2010, St. Etienne, France, October 11-13, 2010*, 01//, Berlin: Springer, 181-188.

Debo, L., Toktay, B. and Van Wassenhove, L. (2005) 'Market segmentation and production technology selection for remanufacturable products', *Management Science,* 51(8), 1193-1205.

'Disaster Profiles', (2015) [online], available: http://www.emdat.be/disaster_profiles/index.html [Accessed 28.11. 2015].

Dobson, P. J. (2001) 'The Philosophy of Critical Realism - An Opportunity for Information Systems Research', *Information Systems Frontiers,* 3(2), 199-210.

Donmoyer, R. (2008) 'Paradigm' in Given, L. M., ed. *The Sage Encyclopedia of Qualitative Research Methods*, Thousand Oaks, CA: SAGE, 592-596.

Dooley, K. J. (1997) 'A Complex Adaptive Systems Model of Organization Change', *Nonlinear Dynamics, Psychology, and Life Sciences,* 1(1), 69-97.

Downward, P. and Mearman, A. (2007) 'Retroduction as mixed-methods triangulation in economic research: reorienting economics into social science', *Cambridge Journal of Economics,* 31(1), 77-99.

Drucker, P. F. (1990) *Managing the Non-Profit Organization,* New York, NY: Butterworth Heinemann.

Dubois, A. and Gadde, L.-E. (2002) 'Systematic combining: an abductive approach to case research', *Journal of Business Research,* 55(7), 553-560.

Duffield, M. (1994) 'Complex emergencies and the crisis of developmentalism', *IDS bulletin,* 25(4), 37-45.

Easterby-Smith, M., Thorpe, R. and Jackson, P. (2012) *Management Research,* 4th ed., Los Angeles, CA: Sage.

Easterly, W. (2003) 'Can foreign aid buy growth?', *The Journal of Economic Perspectives,* 17(3), 23-48.

Easton, G. (2010) 'Critical realism in case study research', *Industrial Marketing Management,* 39(1), 118-128.

Eden, C. and Ackermann, F. (2006) 'Where next for problem structuring methods', *The Journal of the Operational Research Society,* 57(7), 766-768.

Eisenhardt, K. M. (1989) 'Building Theories from Case Study Research', *Academy of Management Review,* 14(4), 532-550.

Eisenhardt, K. M. (2000) 'Paradox, spirals, ambivalence: The new language of change and pluralism', *Academy of Management Review,* 25(4), 703-705.

Ekwall, D. (2012) 'Antagonistic threats against supply chain activities are wicked problems', *Journal of Transportation Security,* 5(2), 123-140.

Ellram, L. M. (1996) 'The use of the case study method in logistics research', *Journal of Business Logistics,* 17(2), 93-138.

Ellram, L. M. and Cooper, M. C. (2014) 'Supply chain management: it's all about the journey, not the destination', *Journal of Supply Chain Management,* 50(1), 8-20.

Emery (1969) *Systems thinking / edited by F.E. Emery,* Penguin Books, 1969.

Evans, J. R. (1997) 'Creativity in OR/MS: the creative problem-solving process', *Interfaces,* 10(6), 106-120.

Everett, J. and Friesen, C. (2010) 'Humanitarian accountability and performance in the Théâtre de l'Absurde', *Critical Perspectives on Accounting,* 21(6), 468-485.

Exploring Africa (2016) 'Five Regions of Africa', [online], available: http://exploringafrica.matrix.msu.edu/curriculum/unit-four/module-twenty/module-twenty-overview/module-twenty-activity-one-2/ [Accessed 1.1. 2016].

Faulkner, B. (2001) 'Towards a framework for tourism disaster management', *Tourism Management,* 22(2), 134-147.

Fielding, N. and Lee, R. M. (1991) *Using Computers in Qualitative Research,* London: Sage.

Fisher, M. (1997) 'What is the right supply chain for your product?', *Harvard Business Review,* 75, 105-116.

Fisher, M. (2007) 'Strengthening the empirical base of operations management', *Manufacturing & service operations management : M & SOM,* 9(4), 368-382.

Fleetwood, S. (1999) *Critical Realism in Economics: Development and Debate,* London New York, NY: Routledge.

Fleetwood, S. (2005) 'Ontology in organization and management studies: A critical realist perspective', *Organization,* 12(2), 197-222.

Flyvbjerg, B. (2013) 'Five Misunderstandings About Case-Study Research', *Qualitative Inquiry,* 12(2), 219-245.

Foster, D. and Jonker, J. (2003) 'Third generation quality management: the role of stakeholders in integrating business into society', *Managerial Auditing Journal,* 18(4), 323-328.

Frankel, R., Naslund, D. and Bolumole, Y. (2005) 'The "White Space" of Logistics Research', *Journal of Business Logistics,* 26(2), 185-208.

Frankfort-Nachmias, C. and Nachmias, D. (1992) *Research Methods in the Social Sciences,* London: Edward Arnold.

Frauley, J. and Pearce, F. (2007) 'Critical realism and the social sciences: methodological and epistemological preliminaries' in Frauley, J. and Pearce, F., eds., *Critical Realism and the Social Sciences: Heterodox Elaborations*, Toronto, Buffalo, London: University of Toronto Press Incorporated, 3-29.

Fredendall, L. D., Craig, J. B., Fowler, P. J. and Damali, U. (2009) 'Barriers to swift, even flow in the internal supply chain of perioperative surgical services department: A case study', *Decision Sciences,* 40(2), 327-349.

Freeman, R. E. (2010) *Strategic Management: A Stakeholder Approach,* Cambridge: Cambridge University Press.

Friend, J. and Hickling, A. (1987) *Planning Under Pressure: The Strategic Choice Approach,* Oxford, UK: Pergamon.

Friend, J. K. and Jessop, W. N. (1977) *Local Government and Strategic Choice an Operational Research Approach to the Processes of Public Planning, Urban and regional planning series,* 2nd ed.*,* Oxford: Pergamon.

Gadde, L.-E., Persson, G. r. and Håkansson, H. k. (2010) *Supply Network Strategies,* 2nd ed.*,* Chichester: John Wiley.

Gage, N. L. (1989) 'The Paradigm Wars and Their Aftermath A "Historical" Sketch of Research on Teaching Since 1989', *Educational Researcher,* 18(7), 4-10.

Galindo, G. and Batta, R. (2013) 'Prepositioning of supplies in preparation for a hurricane under potential destruction of prepositioned supplies', *Socio-Economic Planning Sciences,* 47(1), 20-37.

Gammelgaard, B. (2004) 'Schools in logistics research?: A methodological framework for analysis of the discipline', *International Journal of Physical Distribution & Logistics Management,* 34(6), 479-491.

Gatignon, A., Van Wassenhove, L. and Charles, A. (2010) 'The Yogyakarta earthquake: Humanitarian relief through IFRC's decentralized supply chain', *International Journal of Production Economics,* 126(1), 102-110.

Gattorna, J. (2006) *Living Supply Chains: How to Mobilize the Enterprise around Delivering what Your Customer Wants,* Harlow: F.T Prentice Hall.

Gattorna, J. (2009) *Dynamic Supply Chain Alignment: A New Business Model for Peak Performance in Enterprise Supply Chains across all Geographies,* Farnham: Gower.

Gell-Mann, M. (1994) *The Quark and the Jaguar: Adventures in the Simple and the Complex,* London: Little Brown.

Gencoglu, G., Altmann, G., Smith, R. and Mackay, D. (2002) 'Using Soft Systems Methodology to Address Supply Chain Management Problems', *AUSTRALIAN JOURNAL OF INFORMATION SYSTEMS,* 9, 49-56.

Ghanmi, A. and Shaw, R. H. A. D. (2008) 'Modelling and Analysis of Canadian Forces Strategic Lift and Pre-Positioning Options', *The Journal of the Operational Research Society,* 59(12), 1591–1602.

Gibson, B., Hanna, J. and Menachof, D. (2004) 'Periodical usefulness: an international perspective', *International Journal of Logistics: Research & Applications,* 7(3), 297-311.

Go, D. S. and Page, J. M. (2008) *Africa at a Turning Point? Growth, Aid, and External Shocks,* Washington, D.C.: World Bank.

Golicic, S. L., Davis, D. F. and McCarthy, T. M. (2005) 'A balanced approach to research in supply chain management' in Kotzab, H., Seuring, S., Müller, M. and Reiner, G., eds., *Research Methodologies in Supply Chain Management*, Hamburg: Physica-Verlag.

Golob, U., Johansen, T., Nielsen, A. and Podnar, K. (2014) 'Corporate Social Responsibility as a Messy Problem: Linking Systems and Sensemaking Perspectives', *Systemic Practice and Action Research,* 27(4), 363-376.

Gomanee, K., Girma, S. and Morrissey, O. (2002) *Aid and growth in sub-Saharan Africa : accounting for transmission mechanisms,* University of Nottingham, Centre for Research in Economic Development and International Trade.

Gomm, R., Hammersley, M. and Foster, P. (2000) 'Case Study and Generalization' in Gomm, R., Hammersley, M. and Foster, P., eds., *Case Study Method*, London: Sage Publications Ltd.

González-Benito, J. and González-Benito, Ó. (2006) 'The role of stakeholder pressure and managerial values in the implementation of environmental logistics practices', *International Journal of Production Research,* 44(7), 1353-1373.

Gonçalves, P. (2008) 'System dynamics modeling of humanitarian relief operations', *MIT Sloan School Working Paper,* 4704-08.

Grant, D. B., Lambert, D., Ellram, L. M. and Stock, J. R. (2006) *Fundamentals of Logistics Management,* New York: McGraw-Hill.

Guba, E. and Lincoln, Y. (1994) 'Competing paradigms in qualitative research' in Denzin, N. K. and Lincoln, Y. S., eds., *Handbook of Qualitative Research*, London: Sage, 105-117.

Guba, E. G. (1981) 'Criteria for assessing the trustworthiness of naturalistic inquiries', *Educational Technology research and development,* 29(2), 75-91.

Guba, E. G. (1990) *The Paradigm Dialog,* Newbury Park, CA: Sage Publications.

Guha-Sapir, D., Vos, F., Below, R. and Ponserre, S. (2012) 'Annual Disaster Statistical Review 2011: The Numbers and Trends', available: http://www.cred.be/sites/default/files/ADSR_2011.pdf [accessed 10 February 2013].

Guide, V. D. R. (2000) 'Production planning and control for remanufacturing: industry practice and research needs', *Journal of Operations Management,* 18(4), 467-483.

Guide, V. D. R. and Van Wassenhove, L. N. (2009) 'The Evolution of Closed-Loop Supply Chain Research', *Operations Research,* 57(1), 10-18.

Gumanski, L. (1999) *To Be or Not to Be? Is that the Question? And Other Studies in Ontology, Epistemology and Logic,* Amsterdam: Rodopi.

Gustavsson, L. (2003) 'Humanitarian logistics: context and challenges', *Forced Migration Review,* 18(1), 6-8.

Haavisto, I. and Goentzel, J. (2015) 'Measuring humanitarian supply chain performance in a multi-goal context', *Journal of Humanitarian Logistics & Supply Chain Management,* 5(3), 300-325.

Haavisto, I., Kovács, G. and Spens, K. (2016) 'Introduction' in Kovács, G., Spens, K. and Haavisto, I., eds., *Supply Chain Management for Humanitarians: Tools for Practice*, London: Kogan Page, 3-43.

Habermas, J. (1987) *The Theory of Communicative Action,* Cambridge: Polity.

Haigh, J. J. (2016) *Managing low priority materiel demands from the royal navy's type 45 destroyers - using soft systems methodology to understand a complex supply chain*, unpublished thesis University of Lincoln.

'Haiti Earthquake Maps', (2010) [online], available: http://news.bbc.co.uk/1/hi/world/americas/8466385.stm [Accessed 28.11. 2015].

Hamel, G. (2002) *Leading the Revolution,* 2nd ed.*,* Boston, MA: Harvard Business School Press.

Hammersley, M. and Atkinson, P. (2007) *Ethnography: Principles in Practice,* 3rd ed.*,* London: Routledge.

Hammersley, M. and Gomm, R. (2000) 'Introduction' in Gomm, R., Hammersley, M. and Foster, P., eds., *Case Study Method*, London: SAGE Publications Ltd, 1-16.

Hancock, D. (2010) *Tame, Messy and Wicked Risk Leadership,* Farnham: Gower.

Hannagan, T. (1992) *Marketing for the Non-Profit Sector,* London: Palgrave Macmillan.

Harrington, L. H., Boyson, S. and Corsi, T. M. (2011) *X-SCM: The New Science of X-treme Supply Chain Management,* New York, NY: Routledge.

Harrison, A. and Van Hoek, R. (2011) *Logistics Management and Strategy: Competing through the Supply Chain,* 4th ed.*,* Upper Saddle River, NJ: FT Prentice Hall.

Harré, R. and Madden, E. H. (1975) *Causal Powers,* Oxford: Blackwell.

Harvey, P., Stoddard, A., Harmer, A. and Taylor, G. (2010) *The State of the Humanitarian System: Assessing Performance and Progress - a Pilot Study,* London: Active Learning Network for Accountability and Performance in Humanitarian Action.

Heaslip, G. and Barber, E. (2014) 'Using the military in disaster relief: systemising challenges and opportunities', *Journal of Humanitarian Logistics & Supply Chain Management,* 4(1), 60-82.

Heaslip, G., Sharif, A. M. and Althonayan, A. (2012) 'Employing a systems-based perspective to the identification of inter-relationships within humanitarian logistics', *International Journal of Production Economics,* 139(2), 377-392.

Hellingrath, B. and Widera, A. (2011) 'Survey on major challenges in humanitarian logistics', in *8th International ISCRAM Conference*, Lisbon, Portugal,

Herlin, H. and Pazirandeh, A. (2012) 'Nonprofit organizations shaping the market of supplies', *International Journal of Production Economics,* 139(2), 411-421.

Herzer, D. and Nunnenkamp, P. (2013) 'Private donations, government grants, commercial activities, and fundraising: Cointegration and causality for NGOs in international development cooperation', *World Development,* 46, 234-252.

Higuchi, T. and Troutt, M. (2008) *Life Cycle Management in Supply Chains: Identifying Innovations through the Case of the VCR,* Hershey, NY: IGI Publishing.

Hilhorst, D. (2002) 'Being good at doing good? Quality and accountability of humanitarian NGOs', *Disasters,* 26(3), 193-212.

Hill, C. W. and Jones, T. M. (1992) 'Stakeholder-agency theory', *Journal of Management Studies,* 29(2), 131-154.

Hindle, T., Checkland, P., Mumford, M. and Worthington, D. (1995) 'Developing a methodology for multidisciplinary action research: A case study', *The Journal of the Operational Research Society,* 46(4), 453-464.

Hodgkinson, G. P. and Healey, M. P. (2008) 'Toward a (pragmatic) science of strategic intervention: Design propositions for scenario planning', *Organization Studies,* 29(3), 435-457.

Hodgkinson, G. P. and Starkey, K. (2012) 'Extending the Foundations and Reach of Design Science: Further Reflections on the Role of Critical Realism', *British Journal of Management,* 23(4), 605-610.

Holguín-Veras, J., Hart, W. H., Jaller, M., Van Wassenhove, L. N., Pérez, N. and Wachtendorf, T. (2012a) 'Invited research paper: On the unique features of post-disaster humanitarian logistics', *Journal of Operations Management,* 30(7), 494-506.

Holguín-Veras, J., Jaller, M. and Wachtendorf, T. (2012b) 'Comparative performance of alternative humanitarian logistic structures after the Port-au-Prince earthquake: ACEs, PIEs, and CANs', *Transportation Research Part A,* 46, 1623-1640.

Holland, J. H. (1995) *Hidden Order: How Adaptation Builds Complexity,* Reading, MA; Wokingham, England: Addison-Wesley.

Holmberg, S. (2000) 'A systems perspective on supply chain measurements', *International Journal of Physical Distribution & Logistics Management,* 30(10), 847-868.

Horn, K. (2012) 'Is your business's supply chain prepared for the Olympics?', *Logistics & Transport Focus,* 14(3), 58-58.

International Development Committee (2011) 'The Humanitarian Response to the Pakistan Floods', [online], available: http://www.publications.parliament.uk/pa/cm201012/cmselect/cmintdev/615/61504.htm [Accessed 14.12. 2015].

Jahre, M. and Heigh, I. (2008) 'Does failure to fund preparedness mean donors must be prepared to fund failure in humanitarian supply chains?', *Beyond Business Logistics. NOFOMA Conference Proceedings, Helsinki, Finland B2 - Beyond Business Logistics. NOFOMA Conference Proceedings, Helsinki, Finland,* 265-282.

Jahre, M., Jensen, L. M. and Listou, T. (2009) 'Theory development in humanitarian logistics: a framework and three cases', *Management Research News,* 32(11), 1008-1023.

Jonassen, D. H. (1991) 'Objectivism versus constructivism: Do we need a new philosophical paradigm?', *Educational Technology Research and Development,* 39(3), 5-14.

Jones, S. (1985) 'Depth interviewing' in Walker, R., ed. *Applied qualitative research*, Aldershot: Gower Publishing Company Limited.

Jones, T. M. and Wicks, A. C. (1999) 'Convergent Stakeholder Theory', *Academy of Management Review,* 24(2), 206-221.

Kahn, R. L. and Cannell, C. (1957) *The Synamics of Interviewing: Theory, Technique, and Cases,* New York and Chichester: Wiley.

Kahneman, D. (2011) *Thinking, Fast and Slow,* London: Allen Lane.

Kaplan, R. S. (2001) 'Strategic Performance Measurement and Management in Nonprofit Organizations', *Nonprofit Management & Leadership,* 11(3), 354-362.

Kauffman, S. A. (1995) *At Home in the Universe: The Search for Laws of Self-Organization and Complexity,* New York; Oxford: Oxford University Press.

Kelemen, M. and Rumens, N. (2008) *An Introduction to Critical Management Research,* Los Angeles, CA; London: SAGE.

Kelle, U., Prein, G. and Bird, K. (1995) *Computer-Aided Qualitative Data Analysis: Theory, Methods and Practice,* London: Sage.

Ketokivi, M. and Choi, T. (2014) 'Renaissance of case research as a scientific method', *Journal of Operations Management,* 32(5), 232-240.

Kidder, L. H. and Judd, C. M. (1986) *Research Methods in Social Relations,* 5th ed., New York, NY; London: CBS Publishing.

Kiel, L. D. (1991) 'Lessons from the nonlinear paradigm: Applications of the theory of dissipative structures in the', *Social Science Quarterly (University of Texas Press),* 72(3), 431-443.

King, J. B. (1993) 'Learning to solve the right problems: the case of nuclear power in America', *Journal of Business Ethics,* 12(2), 105-116.

Klaes, M. (2012) 'Paradigm "wars" as methodenstreit: Methodology of management studies meets economic methodology', *International Journal of Organizational Analysis,* 20(1), 13-24.

Kovács, G. (2008) 'Corporate environmental responsibility in the supply chain', *Journal of Cleaner Production,* 16(15), 1571-1578.

Kovács, G. (2011) 'So where next? Developments in humanitarian logistics' in Christopher, M. and Tatham, P., eds., *Humanitarian Logistics Meeting the Challenge of Preparing for and Responding to Disasters*, London: Kogan Page Limited.

Kovács, G. (2012) 'The outreach of humanitarian logistics research', *Journal of Humanitarian Logistics and Supply Chain Management,* 2(1), 6-8.

Kovács, G., Matopoulos, A. and Hayes, O. (2010) 'A community-based approach to supply chain design', *International Journal of Logistics: Research & Applications,* 13(5), 411-422.

Kovács, G. and Spens, K. (2008) 'Humanitarian logistics revisited' in Stentoft Arlbjorn, J., Halldorsson, A., Jahre, M. and Spens, K., eds., *Northern Lights in Logistics and Supply Chain Management*, Copenhagen: Copenhagen Business School Press, 217-232.

Kovács, G. and Spens, K. (2009) 'Identifying challenges in humanitarian logistics', *International Journal of Physical Distribution & Logistics Management,* 39(6), 506-528.

Kovács, G. and Spens, K. M. (2005) 'Abductive reasoning in logistics research', *International Journal of Physical Distribution & Logistics Management,* 35(2), 132-144.

Kovács, G. and Spens, K. M. (2007) 'Humanitarian logistics in disaster relief operations', *International Journal of Physical Distribution & Logistics Management,* 37(2), 99-114.

Kovács, G. and Spens, K. M. (2011) 'Humanitarian logistics and supply chain management: the start of a new journal', *Journal of Humanitarian Logistics & Supply Chain Management,* 1(1), 5-14.

Kovács, G. and Tatham, P. (2009) 'Responding to disruptions in the supply network - from dormant to action', *Journal of Business Logistics,* 30(2), 215-229.

Kovács, G. and Tatham, P. (2010) 'What is Special about a Humanitarian Logistician? A survey of logistic skills and performance', *Supply Chain Forum,* 11(3), 32-41.

Kovács, G., Tatham, P. and Larson, P. D. (2012) 'What Skills Are Needed to be a Humanitarian Logistician?', *Journal of Business Logistics,* 33(3), 245-258.

Krishnan, V. and Ulrich, K. T. (2001) 'Product Development Decisions: A Review of the Literature', *Management Science,* 47(1), 1-22.

Kuhn, T. (1962) *The Structure of Scientific Revolutions,* Chicago: University of Chicago Press.

Kumar, S. and Havey, T. (2013) 'Before and after disaster strikes: A relief supply chain decision support framework', *International Journal of Production Economics,* 145(2), 613-629.

Kunz, N. and Reiner, G. (2012) 'A meta-analysis of humanitarian logistics research', *Journal of Humanitarian Logistics & Supply Chain Management,* 2(2), 116-147.

Kunz, N., Reiner, G. and Gold, S. (2014) 'Investing in disaster management capabilities versus pre-positioning inventory: A new approach to disaster preparedness', *International Journal of Production Economics,* 157, 261-272.

L'Hermitte, C., Tatham, P., Bowles, M. and Brooks, B. (2016) 'Developing organisational capabilities to support agility in humanitarian logistics', *Journal of Humanitarian Logistics & Supply Chain Management,* 6(1), 72-100.

Lachapelle, P. R., McCool, S. F. and Patterson, M. E. (2003) 'Barriers to Effective Natural Resource Planning in a 'Messy' World', *Society & Natural Resources,* 16, 473-490.

Lambert, D. M. and Cooper, M. C. (2000) 'Issues in Supply Chain Management', *Industrial Marketing Management,* 29, 65-83.

Langdon, C. S. and Sikora, R. T. (2006) 'Conceptualizing co-ordination and competition in supply chains as complex adaptive system', *Information systems and e-business management : ISeB,* 4(1), 71-81.

Langley, A. (1999) 'Strategies for theorizing from process data', *Academy of Management Review,* 24(4), 691-710.

Lansing, J. S. (2003) 'Complex Adaptive Systems', *Annual Review of Anthropology,* 32, 183-204.

Lappenbusch, S. (2006) 'Methods for Researching Humanitarian Relief Systems' in *International Professional Communication Conference Proceedings*, New York, NY: IEEE.

Larson, P. D. and Halldórsson, A. (2002) 'What is SCM? And, Where is It?', *Journal of Supply Chain Management,* 38(4), 36-44.

Larson, P. D. and Halldórsson, A. (2004) 'Logistics versus supply chain management: an international survey', *International Journal of Logistics: Research & Applications,* 7(1), 17-31.

Lavassani, K. M. and Movahedi, B. (2010) 'Critical analysis of the supply chain management theories: Toward the stakeholder theory', *POMS 21st Annual Conference*.

Lawson, T. (1998) 'Economic science without experimentation' in Archer, M., Bhaskar, R., Collier, A., Lawson, T. and Norrie, A., eds., *Critical Realism: Essential Readings*, London: Routledge, 144-169.

Layder, D. (1993) *New Strategies in Social Research: An Introduction and Guide,* Cambridge: Polity.

Lee, H. L. (2004) 'THE TRIPLE-A Supply Chain', *Harvard Business Review,* 82(10), 102-113.

Lee, H. W. and Zbinden, M. (2003) 'Marrying logistics and technology for effective relief', *Forced Migration Review,* 18, 34-35.

Leiras, A., Jr, I. d. B., Peres, E. Q., Bertazzo, T. R. and Yoshizaki, H. T. Y. (2014) 'Literature review of humanitarian logistics research: trends and challenges', *Journal of Humanitarian Logistics & Supply Chain Management,* 4(1), 95-130.

Lettieri, E., Masella, C. and Radaelli, G. (2009) 'Disaster management: findings from a systematic review', *Disaster Prevention and Management,* 18(2), 117-136.

Levin, S. A. (1998) 'Ecosystems and the Biosphere as Complex Adaptive Systems', *Ecosystems,* 1(5), 431–436.

Levy, V. (1988) 'Aid and growth in Sub-Saharan Africa: the recent experience', *European Economic Review,* 32(9), 1777-1795.

Lewin, R. (1993) *Complexity: Life at the Edge of Chaos,* London: Dent.

Lincoln, Y. S. and Guba, E. (1985) *Naturalistic Inquiry,* Beverly Hills, CA: Sage.

Lincoln, Y. S. and Guba, E. G. (1986) 'But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation', *New Directions for Evaluation,* 1986(30), 73-84.

Lincoln, Y. S., Lynham, S. A. and Guba, E. G. (2013) 'Paradigmatic controversies, contradictions, and emerging confluences revisited' in Denzin, N. K. and Lincoln, Y. S., eds., *The landscape of qualitative research*, London: Sage.

Lodree, E. J. (2011) 'Pre-storm emergency supplies inventory planning', *Journal of Humanitarian Logistics and Supply Chain Management,* 1(1), 28-48.

Long, D. (1997) 'Logistics for disaster relief engineering on the run', *IIE Solutions,* 29, 26-29.

Long, D. (2003) *International Logistics: Global Supply Chain Management,* New York, NY: Springer.

Long, D. and Wood, D. (1995) 'The logistics of famine relief', *Journal of Business Logistics,* 16(1), 213-229.

Lu, Q., Goh, M. and De Souza, R. (2013) 'Learning mechanisms for humanitarian logistics', *Journal of Humanitarian Logistics & Supply Chain Management,* 3(2), 149-161.

Lummus, R. R., Krumwiede, D. W. and Vokurka, R. J. (2001) 'The relationship of logistics to supply chain management: developing a common industry definition', *Industrial Management & Data Systems,* 101(8), 426 - 432.

Lund, R. T. (1996) *The Remanufacturing Industry Hidden Giant,* Boston: Boston University Press.

Lyles, M. A. (2014) 'Organizational learning, knowledge creation, problem formulation and innovation in messy problems', *European Management Journal,* 32(1), 132-136.

Lyles, M. A. and Mitroff, I. I. (1980) 'Organizational Problem Formulation: An Empirical Study', *Administrative Science Quarterly,* 25(1), 102-119.

MacCarthy, B. L., Lewis, M., Voss, C. and Narasimhan, R. (2013) 'The same old methodologies? Perspectives on OM research in the post-lean age', *International Journal of Operations & Production Management,* 33(7), 934.

Macrae, G. (2008) 'Could the system work better? Scale and local knowledge in humanitarian relief', *Development in Practice,* 18(2), 190-200.

Mangan, J., Lalwani, C. and Butcher, T. (2008) *Global Logistics and Supply Chain Management,* Chichester: Wiley.

Maon, F., Lindgreen, A. and Vanhamme, F. (2009) 'Developing supply chains in disaster relief operations through cross-sector socially oriented collaborations: a theoretical model', *Supply Chain Management,* 14(2), 149-164.

Margesson, R. and Taft-Morales, M. (2010) *Haiti Earthquake: Crisis and Response*, Washington D.C., USA: Congressional Research Service.

Marshall, C. and Rossman, G. B. (1999) *Designing Qualitative Research,* 2nd ed.*,* Thousand Oaks, CA: Sage.

Mason-Jones, R., Naylor, B. and Towill, D. (2000) 'Lean, agile or leagile? Matching your supply chain to the marketplace', *International Journal of Production Research,* 38(17), 4061-4070.

Mason-Jones, R. and Towill, D. R. (1999a) 'Total Cycle Time Compression and the Agile Supply Chain', *International Journal of Production Economics,* 62(1-2), 61-73.

Mason-Jones, R. and Towill, D. R. (1999b) 'Using the Information Decoupling Point to Improve Supply Chain Performance', *International Journal of Logistics Management,* 10(2), 13-26.

Masterman, M. (1970) 'The nature of a paradigm' in Lakatos, I. and Musgrave, A., eds., *Criticism and the growth of knowledge*, Cambridge: Cambridge University Press, 58-89.

Maull, R., Geraldi, J. and Johnston, R. (2012) 'Service Supply Chains: A Customer Perspective', *Journal of Supply Chain Management,* 48(4), 72-86.

McClintock, A. (2009) 'The Logistics of Humanitarian Emergencies: Notes From the Field', *Journal of Contingencies & Crisis Management,* 17(4), 295-302.

McCool, S. F. and Guthrie, K. (2001) 'Mapping the Dimensions of Successful Public Participation in Messy Natural Resources Management Situations', *Society & Natural Resources,* 14(4), 309-323.

McCutcheon, D. M. and Meredith, J. R. (1993) 'Conducting case study research in operations management', *Journal of Operations Management,* 11(3), 239-256.

McEntire, D. A. (2004) 'Development, disasters and vulnerability: a discussion of divergent theories and the need for their integration', *Disaster Prevention & Management,* 13(3), 193-198.

McLachlin, R. and Larson, P. D. (2011) 'Building humanitarian supply chain relationships: lessons from leading practitioners', *Journal of Humanitarian Logistics & Supply Chain Management,* 1(1), 32-49.

McNeill, P. and Chapman (2005) *Research Methods,* 3rd ed.*,* London: Routledge.

Melnyk, S. A. and Handfield, R. B. (1998) 'May you live in interesting times…the emergency of theory-driven empirical research', *Journal of Operations Management,* 16(4), 311-319.

Mentzer, J. T. (2008) 'Rigor versus relevance: Why would we choose only one?', *Journal of Supply Chain Management,* 44(2), 72-77.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Soonhoong, M., Nix, N. W., Smith, C. D. and Zacharia, Z. G. (2001) 'Defining Supply Chain Management', *Journal of Business Logistics,* 22(2), 1-25.

Mentzer, J. T. and Flint, D. J. (1997) 'Validity in logistics research', *Journal of Business Logistics,* 18(1), 199-216.

Mentzer, J. T. and Kahn, K. B. (1995) 'A framework of logistics research', *Journal of Business Logistics,* 16(1), 231-250.

Meredith, J. (1998) 'Building operations management theory through case and field research', *Journal of Operations Management,* 16(4), 441-454.

Meredith, J. R., Raturi, A., Amoako-Gyampah, K. and Kaplan, B. (1989) 'Alternative research paradigms in operations', *Journal of Operations Management,* 8(4), 297-326.

Meyer, C. (2001) 'A case in case study methodology', *Field Methods,* 13(4), 329-352.

Micheli, P. and Kennerley, M. (2005) 'Performance measurement frameworks in public and non-profit sectors', *Production Planning & Control,* 16(2), 125-134.

Miles, M. B. and Huberman, A. M. (1994) *Qualitative data analysis,* 2nd ed.*,* Thousand Oaks, CA: Sage.

Miles, M. B., Huberman, A. M. and Saldana, J. (2014) *Qualitative Data Analysis: A Methods Sourcebook,* Thousand Oaks, CA: Sage.

Millar, M. (2015) *Global Supply Chain Ecosystems: Strategies for Competitive Advantage in a Complex, Connected World,* London: Kogan Page.

Mingers, J. (2000a) 'The contribution of critical realism as an underpinning philosophy for OR/MS and systems', *Journal of Operations Research Society,* 51(11), 1256-1270.

Mingers, J. (2000b) 'Variety is the spice of life: combining soft and hard OR/MS methods', *International Transactions in Operational Research,* 7(6), 673.

Mingers, J. (2006a) 'A Critique of Statistical Modelling in Management Science from a Critical Realist Perspective: Its Role within Multimethodology', *Journal of the Operations Research Society,* 57(2), 202-219.

Mingers, J. (2006b) *Realizing Systems Thinking: Knowledge and Action in Management Science, Contemporary Systems Thinking,* Boston, MA : Springer US.

Mingers, J., Mutch, A. and Willcocks, L. (2013) 'Critical Realism in Information Systems Research', *MIS Quarterly,* 37(3), 795-802.

Mintzberg, H., Raisinghani, D. and Théorêt, A. (1976) 'The Structure of 'Unstructured' Decision Processes', *Administrative Science Quarterly,* 21(2), 246-275.

Mitchell, R. K., Agle, B. R. and Wood, D. J. (1997) 'Toward a theory of stakeholder identification and salience', *Academy of Management Review,* 22(4), 853-886.

Mitroff, II, Alpaslan, C. M. and Mason, R. O. (2012) 'The Messy Business of Management', *Mit Sloan Management Review,* 54(1), 96-96.

Mitroff, I. I. and Mason, R. O. (1980) 'Structuring ill-structured policy issues: Further explorations in a methodology for messy problems', *Strategic Management Journal,* 1(4), 331-342.

Moe, T., Gehbauer, F., Senitz, S. and Mueller, M. (2007) 'Balanced scorecards for natural disaster management projects', *Disaster Prevention and Management: An International Journal,* 16(5), 85 - 806.

Mollenkopf, D., Russo, I. and Frankel, R. (2007) 'The returns management process in supply chain strategy', *International Journal of Physical Distribution & Logistics Management,* 37(7), 568-592.

Moore, D. M. and Taylor, D. H. (2011) 'Humanitarian logistics professionalism' in Christoper, M. and Tatham, P., eds., *Humanitarian Logistics Meeting the Challenges of Preparing for and Responding to Disasters*, London, UK: Kogan Page Limited.

Morgan, G. (1986) *Images of Organizations,* Newbury Park: Sage.

Moszynski, P. (2010) 'Donor fatigue is slashing access to AIDS care in Africa, warns charity', *BMJ: British Medical Journal,* 340(c2844).

Naslund, D. (2002) 'Logistics needs qualitative research—especially action research', *International Journal of Physical Distribution & Logistics Management,* 32(5), 321-338.

Natarajarathinam, M., Capar, I. and Narayanan, A. (2009) 'Managing supply chains in times of crisis: a review of literature and insights', *International Journal of Physical Distribution & Logistics Management,* 39(7), 535-573.

Neal, D. M. (1997) 'Reconsidering the phases of disaster', *International Journal of Mass Emergencies and Disasters,* 15(2), 239-264.

New, S. J. (1997) 'The scope of supply chain management research', *Supply Chain Management: An International Journal,* 2(1), 15-22.

New, S. J. and Payne, P. (1995) 'Research frameworks in logistics: Three models, seven dinners and a survey', *International Journal of Physical Distribution & Logistics Management,* 25(10), 60-77.

New York conference recovery pledge status and modalities as of December 2012 in USD millions, (2013) New York, NY, USA: U.N. Office of the Special Envoy for Haiti.

Norton, P. and Allinson, L. (1995) *Introduction to Research Methods,* 2nd ed.*,* Hull: University of Humberside.

O'Gorman, S. and Pirner, P. (2006) 'Measuring and monitoring stakeholder relationships: Using TRI*M as an innovative tool for corporate communication' in Huber, M. and Pallas, M., eds., *Customising Stakeholder Management Strategies: Concepts for long-term business success*, Berlin: Springer.

Oakley, A. (1999) 'Paradigm wars: some thoughts on a personal and public trajectory', *International Journal of Social Research Methodology,* 2(3), 247-254.

OECD (2014a) '*Country Programmable Aid (CPA) : historical series and projections*', [online], available: http://public.tableau.com/views/FSS-recipientperspective/Charts?amp [Accessed 25.12. 2015].

OECD (2014b) 'Global Aid Outlook', [online], available: http://www.oecd.org/dac/aid-architecture/aidpredictability.htm [Accessed 25.12. 2015].

Oloruntoba, R. and Gray, R. (2006) 'Humanitarian aid: an agile supply chain?', *Supply Chain Management,* 11(2), 115-126.

Oloruntoba, R. and Gray, R. (2009) 'Customer service in emergency relief chains', *International Journal of Physical Distribution & Logistics Management,* 39(6), 486-495.

Oloruntoba, R. and Kovács, G. (2015) 'A commentary on agility in humanitarian aid supply chains', *Supply Chain Management: An International Journal,* 20(6), 708-716.

Overstreet, R. E., Hall, D., Hanna, J. B. and Rainer Jr, R. K. (2011) 'Research in humanitarian logistics', *Journal of Humanitarian Logistics & Supply Chain Management,* 1(2), 114-131.

Park-Poaps, H. and Rees, K. (2010) 'Stakeholder Forces of Socially Responsible Supply Chain Management Orientation', *Journal of Business Ethics,* 92(2), 305-322.

Patel, P., Azadegan, A. and Ellram, L. M. (2013) 'The Effects of Strategic and Structural Supply Chain Orientation on Operational and Customer-Focused Performance', *Decision Sciences Journal,* 44(4), 713-753.

Pathak, S. D., Day, J. M., Nair, A., Sawaya, W. J. and Kristal, M. M. (2007) 'Complexity and Adaptivity in Supply Networks: Building Supply Network Theory Using a Complex Adaptive Systems Perspective', *Decision Sciences,* 38(4), 547-580.

Pathak, S. D., Dilts, D. M. and Mahadevan, S. (2009) 'Investigating population and topological evolution in a complex adaptive supply network', *The Journal of Supply Chain Management: A Global Review of Purchasing and Supply,* 45(3), 54-67.

Pazirandeh, A. and Herlin, H. (2014) 'Unfruitful cooperative purchasing A case of humanitarian purchasing power', *Journal of Humanitarian Logistics & Supply Chain Management,* 4(1), 24-43.

Pearce, F. (2007) 'Bhaskar's critical realism: an appreciative inntroduction and friendly critique' in Frauley, J. and Pearce, F., eds., *Critical Realism and the Social Sciences: Heterodox Elaborations*, Toronto, Buffalo, London: University of Toronto Press Incorporated, 30-63.

Pedraza-Martinez, A. J., Stapleton, O. and Van Wassenhove, L. N. (2011) 'Field vehicle fleet management in humanitarian operations: A case-based approach', *Journal of Operations Management,* 29(5), 404-421.

Pedraza-Martinez, A. J., Stapleton, O. and Van Wassenhove, L. N. (2013) 'On the use of evidence in humanitarian logistics research', *Disasters,* 37, S51-S67.

Perry, M. (2007) 'Natural disaster management planning: A study of logistics managers responding to the tsunami', *International Journal of Physical Distribution & Logistics Management,* 37(5), 409-433.

Peterson, H. (2009) 'Transformational supply chains and the 'wicked problem' of sustainability: aligning knowledge, innovation, entrepreneurship, and

leadership', *Journal on Chain and Network ScienceJournal on Chain and Network Science,* 9(2), 71-82.

Pettit, S. and Beresford, A. (2009) 'Critical success factors in the context of humanitarian aid supply chains', *International Journal of Physical Distribution & Logistics Management,* 39(6), 450-468.

Pettit, S. J. and Beresford, A. K. C. (2005) 'Emergency relief logistics: an evaluation of military, non-military and composite response models', *International Journal of Logistics: Research & Applications,* 8(4), 313-331.

Phillips, R., Freeman, R. E. and Wicks, A. C. (2003) 'What stakeholder theory is not', *Business Ethics Quarterly,* 13(4), 24-46.

Pilkington, A. and Meredith, J. (2009) 'The evolution of the intellectual structure of operations management—1980–2006: A citation/co-citation analysis', *Journal of Operations Management,* 27(3), 185-202.

Platt, A. and Warwick, S. (1995) 'Review of soft systems methodology', 19.

Pochampally, K. K. and Gupta, S. M. (2008) 'A multiphase fuzzy logic approach to strategic planning of a reverse supply chain network', *Transactions on Electronics Packaging Manufacturing,* 31(1), 72-82.

Porter, M. E. (2004) *Competitive Advantage: Creating and Sustaining Superior Performance,* New York: Free Press.

Pratt, M. G. (2009) 'For the lack of a boilerplate: Tips on writing up (and reviewing) qualitative research', *Academy of Management Journal,* 52(5), 856-862.

Prigogine, I. and Stengers, I. (1984) *Order out of Chaos: Man's New Dialogue with Nature,* London: Heinemann.

Purvis, L., Gosling, J. and Naim, M. M. (2014) 'The development of a lean, agile and leagile supply network taxonomy based on differing types of flexibility', *International Journal of Production Economics,* 151, 100-112.

Pérouse de Montclos, M.-A. (2012) 'Humanitarian action in developing countries: Who evaluates who?', *Evaluation and Program Planning,* 35(1), 154-160.

Quinn, F. (2011) 'One more time: people, process, technology', *Supply Chain Management Review,* 15(3), 2-3.

Quinn, F. J. (2004) 'People, process, technology: to achieve any measure of supply chain success, you need to keep each of these critical elements in balance', *Supply Chain Management Review,* 8(1), 3-4.

Ragin, C. C. and Becker, H. S. (1992) *What is a Case? Exploring the Foundations of Social Inquiry,* Cambridge: Cambridge University Press.

Ransome, P. (2010) *Social Theory for Beginners,* Bristol: The Policy Press.

Rawls, C. G. and Turnquist, M. A. (2011) 'Pre-positioning Planning for Emergency Response with Service Quality Constraints', *OR Spectrum,* 33(3), 481-498.

Raynard, P. (2000) *Mapping Accountability in Humanitarian Assistance,* London: Active Learning Network for Accountability and Performance in Humanitarian Assistance (ALNAP).

Reed, M. (2005) 'Doing the Loco-Motion: Response to Contu and Willmott's Commentary on 'The Realist Turn in Organization and Management Studies", *Journal of Management Studies,* 42(8), 1663-1673.

Regnier, P., Neri, B., Scuteri, S. and Miniati, S. (2008) 'From emergency relief to livelihood recovery: Lessons learned from post-tsunami experiences in Indonesia and India', *Disaster Prevention & Management,* 17(3), 410-429.

Remenyi, D., Williams, B., Money, A. and Swartz, E. (1998) *Doing Research in Business and Management: An Introduction to Process and Method,* London: Sage.

Richey, R. G. (2009) 'The supply chain crisis and disaster pyramid A theoretical framework for understanding preparedness and recovery', *International Journal of Physical Distribution and Logistics Management,* 39(7), 619-628.

Rigby, C., Day, M., Forrester, P. and Burnett, J. (2000) 'Agile supply: rethinking systems thinking, systems practice', *International Journal of Agile Management Systems,* 2(3), 178-186.

Ritchey, T. (2011) *Wicked Problems – Social Messes: Decision Support Modelling with Morphological Analysis,* Berlin, Heidelberg: Springer.

Ritchie, B. W. (2004) 'Chaos, crises and disasters: a strategic approach to crisis management in the tourism industry', *Tourism Management,* 25(6), 669-683.

Rittel, H. W. J. and Webber, M. M. (1973) 'Dilemmas in a general theory of planning', *Policy Sciences,* 4(2), 155-169.

Rittel, H. W. J. and Webber, M. M. (2007) 'Dilemmas in a General Theory of Planning' in Wegener, M., Button, K. and Nijkamp, P., eds., *Planning History and Methodology*, An Elgar Reference Collection. Classics in Planning series, vol. 5. Cheltenham, U.K. and Northampton, Mass.: Elgar, 311-325.

Rosenhead, J. (1996) 'What's the Problem? An Introduction to Problem Structuring Methods', *Interfaces,* 26(6), 117-131.

Rotaru, K., Churilov, L. and Flitman, A. (2014) 'Can critical realism enable a journey from description to understanding in operations and supply chain management?', *Supply Chain Management,* 19(2), 117-125.

Roth, G. L. and Senge, P. M. (1996) 'From theory to practice: Research territory, processes and structure at an organizational learning centre', *Journal of Organizational Change Management,* 9(1), 92-106.

Saldana, J. (2013) *The Coding Manual for Qualitative Researchers,* 2nd ed.*,* Los Angeles, CA; London: SAGE.

Salmeron, J. and Apte, A. (2010) 'Stochastic optimization for natural disaster asset prepositioning', *Production and Operations Management,* 19(5), 561-574.

Sampson, S. E. (2000) 'Customer- supplier duality and bidirectional supply chains in service organizations', *International Journal of Service Industry management,* 11(4), 348-364.

Sampson, S. E. (2010) 'The Unified Service Theory: A Paradigm for Service Science' in Maglio, P. P., Kieliszewski, C. A. and Spohrer, J. C., eds., *Handbook of Service Science* [Non-fiction], Boston, MA: Springer US.

Sampson, S. E. (2012) 'Visualizing service operations', *Journal of Service Research,* 15(2), 182-198.

Sampson, S. E. and Froehle, C. M. (2006) 'Foundations and Implications of a Proposed Unified Services Theory', *Production & Operations Management,* 15(2), 329-343.

Saunders, M., Lewis, P. and Thornhill, A. (2006) *Research Methods for Business Students,* 4th ed.*,* Harlow: Financial Times Prentice Hall.

Saunders, M., Lewis, P. and Thornhill, A. (2012) *Research Methods for Business Students,* 5th ed.*,* Harlow: Financial Times Prentice Hall.

Savaskan, R. C., Bhattacharya, S. and Van Wassenhove, L. N. (2004) 'Closed-loop supply chain models with product remanufacturing', *Management Science,* 50(2), 239-252.

Sawhill, J. C. and Williamson, D. (2001) 'Mission Impossible?: Measuring Success in Nonprofit Organizations', *Nonprofit Management and Leadership,* 11(3), 371-386.

Sayce, S., Walker, A. and McIntosh, A. (2004) *Building Sustainability in the Balance Promoting Stakeholder Dialogue,* London: Estate Gazette Books.

Sayer, A. (1992) *Method in Social Science: A Realistic Approach,* 2nd ed.*,* London: Routledge.

Sayer, A. (2000) *Realism and Social Science,* Thousand Oaks, CA; London: Sage.

Scarbrough, E. and Tanenbaum, E. (1998) *Research Strategies in the Social Sciences: A Guide to New Approaches,* Oxford: Oxford University Press.

Schiffling, S. and Piecyk, M. (2014) 'Performance measurement in humanitarian logistics: a customer-oriented approach', *Journal of Humanitarian Logistics and Supply Chain Management,* 4(2), 198-221.

Schofield, J. W. (2000) 'Increasing the Generalizability of Qualitative Research' in Gomm, R., Hammersley, M. and Foster, P., eds., *Case Study Method*, London: Sage Publications Ltd.

Schulz, S. F. and Heigh, I. (2009) 'Logistics performance management in action within a humanitarian organization', *Management Research News,* 32(11), 1038-1049.

Schwandt, T. A. (2007) *The SAGE Dictionary of Qualitative Inquiry,* 3rd ed.*,* London: SAGE.

Schönsleben, P. (2016) *Integral Logistics Management: Operations and Supply Chain Management within and across Companies,* 5th ed.*,* Boca Raton, FL: CRC Press.

Seipel, J. (2011) 'The impossible interface? Combining humanitarian logistics and military supply capabilities' in Christoper, M. and Tatham, P., eds., *Humanitarian Logistics Meeting the Challenges of Preparing for and Responding to Disasters*, London, UK: Kogan Page Limited, 216-238.

Shah, R., Goldstein, S. M., Unger, B. T. and Henry, T. D. (2008) 'Explaining Anomalous High Performance in a Health Care Supply Chain', *Decision Sciences,* 39(4), 759-789.

Shaluf, I. M. (2007) 'An overview on disasters', *Disaster Prevention & Management,* 16(5), 687-703.

Shaluf, I. M., Ahmadun, F. l.-r. and Said, A. M. (2003) 'A review of disaster and crisis', *Disaster Prevention and Management,* 12(1), 24-32.

Shepherd, C. and Challenger, R. (2013) 'Revisiting paradigm(s) in management research: A rhetorical analysis of the paradigm wars', *International Journal of Management Reviews,* 15(2), 225-244.

Sheppard, A., Tatham, P., Fisher, R. and Gapp, R. (2013) 'Humanitarian logistics: enhancing the engagement of local populations', *Journal of Humanitarian Logistics & Supply Chain Management,* 3(1), 22-37.

Shukla, J. J. (1995) *Relation of Epistemology with Ontology (in Contemporary Philosophy),* Delhi: Kant.

Silverman, D. (2011) *Interpreting Qualitative Data: A Guide to the Principles of Qualitative Research,* 4th ed.*,* London: SAGE.

Simon, H. A. and Newell, A. (1958) 'Heuristic problem solving: The next advance in operations research', *Operations Research,* 6(1), 1-10.

Simons, H. (2009) *Case Study Research in Practice,* Los Angeles ; London: SAGE.

Simpson, D., Power, D. and Samson, D. (2007) 'Greening the automotive supply chain: a relationship perspective', *International Journal of Operations & Production Management,* 27(1), 28-48.

Singapore Red Cross (2010) 'Pakistan Floods:The Deluge of Disaster - Facts & Figures as of 15 September 2010', [online], available: http://reliefweb.int/report/pakistan/pakistan-floodsthe-deluge-disaster-facts-figures-15-september-2010 [Accessed 21.12. 2015].

Skaburskis, A. (2008) 'The Origin of "Wicked Problems"', *Planning Theory & Practice,* 9(2), 277.

Skjoett-Larsen, T. (1999) 'Supply Chain Management: A New Challenge for Researchers and Managers in Logistics', *International Journal of Logistics Management,* 10(2), 41-53.

Slim, H. (2002) 'By What Authority? The Legitimacy and Accountability of Non-Governmental Organizations', *The International Council on Human Rights Policy International Meeting on Global Trends and Human Rights*.

Solem, O. (2003) 'Epistemology and logistics: A critical overview', *Systemic Practice and Action Research,* 16(6), 437-454.

Spens, K. M. and Kovács, G. (2006) 'A content analysis of research approaches in logistics research', *International Journal of Physical Distribution & Logistics Management,* 36(5), 374-390.

Spring, M. and Santos, J. (2015) 'Case study research in operations management: new contexts, new theories, new approaches', in *EurOMA*, Neuchâtel, Switzerland,

Stake, R. E. (2000) 'The Case Study Method in Social Inquiry' in Gomm, R., Hammersley, M. and Foster, P., eds., *Case Study Method*, London: SAGE Publications Ltd, 19-26.

Stauch, J. D. (2011) *Effective Frontline Fundraising: A Guide for Non-Profits, Political Candidates, and Advocacy Groups,* Berkeley, CA: Apress.

Sterman (2000) *Business dynamics : systems thinking and modeling for a complex world / by John D. Sterman,* McGraw-Hill, 2000.

Stevens, G. C. and Johnson, M. (2016) 'Integrating the Supply Chain... 25 years on', *International Journal of Physical Distribution & Logistics Management,* 46(1), 19-42.

Stock, J. R. and Boyer, S. L. (2009) 'Developing a consensus definition of supply chain management: A qualitative study', *International Journal of Physical Distribution & Logistics Management,* 39(8), 690-711.

Stock, J. R. and Lambert, D. M. (2001) *Strategic Logistics Management,* 4th ed., New York; London: McGraw Hill Irwin.

Stoddard, A. (2003) *Humanitarian NGOs: Challenges and Trends,* New York, NY: Humanitarian Policy Group.

Stoianova, V. (2012) *Private Funding: an Emerging Trend in Humanitarian Donorship*, Wells, UK: Global Humanitarian Assistance.

Strogatz, S. H. (2001) 'Exploring complex networks', *Nature,* 410(6825), 268-276.

Strong, D. M. and Volkoff, O. (2010) 'Understanding organization-enterprise system fit: A path to theorizing the information technology artifact', *MIS Quarterly: Management Information Systems,* 34(4), 731-756.

Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R. and Samson, D. (2002) 'Effective case research in operations management: a process perspective', *Journal of Operations Management,* 20(5), 419-433.

Surana, A., Kumara, S., Raghavan, U. N. and Greaves, M. (2005) 'Supply-chain networks: A complex adaptive systems perspective', *International Journal of Production Research,* 43(20), 4235-4265.

Tatham, P. and Christopher, M. (2014) *Humanitarian Logistics: Meeting the Challenge of Preparing for and responding to Disasters,* 2nd ed., London: Kogan Page Limited.

Tatham, P. and Houghton, L. (2011) 'The wicked problem of humanitarian logistics and disaster relief aid', *Journal of Humanitarian Logistics & Supply Chain Management,* 1(1), 15-31.

Tatham, P. and Hughes, K. (2011) 'Humanitarian Logistics Metrics Where We Are and How We Might Improve' in Christoper, M. and Tatham, P., eds., *Humanitarian Logistics Meeting the Challenges of Preparing for and Responding to Disasters*, London, UK: Kogan Page Limited, 65-84.

Tatham, P. and Kovács, G. (2007) 'The humanitarian supply network in rapid onset disasters' in Halldorsson, A. and Stefansson, G., eds., *19th Annual Conference for Nordic Researchers in Logistics, NOFOMA 2007*, Reykjavik: 1059-74.

Tatham, P. and Kovács, G. (2010) 'The application of "swift trust" to humanitarian logistics', *International Journal of Production Economics,* 126(1), 35-45.

Tatham, P. and Pettit, S. (2010) 'Transforming humanitarian logistics: the journey to supply network management', *International Journal of Physical Distribution & Logistics Management,* 40(8-9), 609-622.

Tatham, P. and Rietjens, S. B. (2016) 'Integrated disaster relief logistics: a stepping stone towards viable civil-military networks?', *Disasters,* 40(1), 7-25.

Tatham, P. and Spens, K. (2011) 'Towards a humanitarian logistics knowledge management system', *Disaster Prevention and Management,* 20(1), 6-26.

Tatham, P. H., Spens, K. M. and Taylor, D. (2009) 'Development of the academic contribution to humanitarian logistics and supply chain management', *Management Research News,* 32(11), 1-11.

Taylor, D. and Brunt, D. (2001) *Manufacturing Operations and Supply Chain Management: The LEAN Approach,* Stamford, CT: Thomson Learning.

Taylor, D. and Pettit, S. J. (2009) 'A consideration of the relevance of lean supply chain concepts for humanitarian aid provision', *International Journal of Services Technology and Management,* 12(4), 430-444.

'The World Factbook', (2015) [online], available: https://www.cia.gov/library/publications/the-world-factbook/geos/ha.html [Accessed 28.11. 2015].

Thomas, A. (2004) 'Elevating humanitarian logistics', *International Aid & Trade Review*, 102-106.

Thomas, A. and Mizushima, M. (2005) 'Logistics training: necessity or luxury?', *Forced Migration Review*, 60-61.

Thomas, A. S. and Kopczak, L. R. (2005) *From Logistics to Supply Chain Management: The Path Forward in the Humanitarian Sector,* San Francisco, CA: Fritz Institute.

Thornton, J. (2006) 'Nonprofit fundraising in competitive donor markets', *Nonprofit and Voluntary Sector Quarterly,* 35(2), 204-224.

Tomasini, R. M. and Van Wassenhove, L. N. (2009) 'From preparedness to partnerships: case study research on humanitarian logistics', *International Transactions in Operational Research,* 16(5), 549-559.

Tsang, E. W. K. and Kwan, K. M. (1999) 'Replication and theory development in organizational science: A critical realist perspective', *Academy of Management Review,* 24(4), 759-780.

Tsoukas, H. (1989) 'The Validity of Idiographic Research Explanations', *Academy of Management Review,* 14(4), 551-561.

Twigg, J. (2004) *Disaster Risk Reduction: Mitigation and Preparedness in Development and Emergency Programming*, London: Humanitarian Practice Network.

Uneze, E. F. (2009) 'Foreign aid and the real exchange rate in the West African economic and monetary union (WAEMU)', *Applied Econometrics and International Development,* 11(2), 139-161.

United Nations (2012) *Charter of the United Nations: Chapter X: The Economic and Social Council*, New York: United Nations.

United Nations (2015) 'United Nations Millennium Development Goals', [online], available: http://www.un.org/millenniumgoals/bkgd.shtml [Accessed 31.12. 2015].

United Nations OCHA (2015) 'World Humanitarian Data and Trends 2014', [online], available: http://www.unocha.org/data-and-trends-2014/ [Accessed 12.04. 2015].

Vaillancourt, A. (2016) 'A theoretical framework for consolidation in humanitarian logistics', *Journal of Humanitarian Logistics & Supply Chain Management,* 6(1), 2-24.

Van Crefeld, M. (2004) *Supplying War: Logistics from Wallenstein to Patton,* 2nd ed., Cambridge: Cambridge University Press.

Van der Laan, E. A., De Brito, M. P. and Vergunst, D. A. (2009) 'Performance measurement in humanitarian supply chains', *International Journal of Risk Assessment & Management,* 13(1), 22-45.

Van Wassenhove, L. N. (2006) 'Blackett Memorial Lecture - Humanitarian aid logistics: supply chain management in high gear', *Journal of the Operational Research Society,* 57(5), 475-489.

Viswanadham, N. and Samvedi, A. (2013) 'Supplier selection based on supply chain ecosystem, performance and risk criteria', *International Journal of Production Research,* 51(21), 6484-6499.

Vitasek, K. (2010) 'Supply Chain Management Terms and Glossary', available: http://cscmp.org/sites/default/files/user_uploads/resources/downloads/glossary.pdf [accessed 9.10.2013].

Volkoff, O. and Strong, D. M. (2013) 'Critical realism and affordances: theorising IT-associated organizational change processes', *MIS Quarterly,* 37(3), 819-834.

von Bertalanffy, L. (1968) *General Systems Theory,* New York: Braziller.

Voss, C., Tsikriktsis, N. and Frohlich, M. (2002) 'Case research in operations management', *International Journal of Operations and Production Management,* 22(2), 195-219.

Wacker, J. G. (2008) 'A conceptual understanding of requirements for theory-building research: Guidelines for scientific theory building', *Journal of Supply Chain Management,* 44(3), 5-15.

Wagner, C. (1995) 'Decision support for messy problems', *Information & Management,* 28(6), 393-403.

Walker, P. (2004) 'What does it mean to be a professional humanitarian?', *The Journal of Humanitarian Assistance,* 14, 5-10.

Walker, R. (1985) *Applied Qualitative Research,* Aldershot: Gower Publishing Company Limited.

Walton, R., Mays, R. and Haselkorn, M. (2011) 'Defining "fast": Factors affecting the experience of speed in humanitarian logistics', in *8th International ISCRAM Conference*, Lisbon, Portugal,

Waters, D. (2009) *Supply Chain Management: An Introduction to Logistics,* 2nd ed., London: Palgrave Macmillan.

Watts, S. and Stenner, P. (2012) *Doing Q Methodological Research: Theory, Method and Interpretation,* London: SAGE.

Wengraf, T. (2001) *Qualitative Research Interviewing,* London, UK: SAGE Publications Ltd.

Wheatley, M. J. (1999) *Leadership and the New Science Discovering Order in a Chaotic World,* San Francisco, CA: Berrett-Koehler.

Whitten, G. D., Green Jr, K. W. and Zelbst, P. J. (2012) 'Triple-A supply chain performance', *International Journal of Operations & Production Management,* 32(1), 28-49.

Whybark, D. C. (2007) 'Issues in managing disaster relief inventories', *International Journal of Production Economics,* 108(1-2), 228-235.

Wiener, N. (1948) *Cybernetics or Control and Communication in the Animal and the Machine,* New York, NY: John Wiley.

Wijkman, A. and Timberlake, L. (1984) *Natural disasters : acts of God or acts of man?,* London and Washington, DC: Earthscan, International Institute for Environment and Development.

Wolcott, H. F. (2001) *Writing up Qualitative Research,* 2nd ed.*,* London: SAGE.

Womack, J. P. and Jones, D. T. (2005) 'Lean Consumption', *Harvard Business Review,* 83(3), 58-69.

Womack, J. P., Jones, D. T. and Roos, D. (1990) *The Machine that Changed the World,* New York, NY; Oxford: Maxwell Macmillan International.

Wynn, D. and Williams, C. K. (2012) 'Principles for conducting critical realist case study research in information systems', *MIS Quarterly,* 36(3), 787-810.

Yin, R. K. (1989) *Case Study Research: Design and Methods,* Thousand Oaks, CA: Sage.

Yin, R. K. (1993) *Applications of Case Study Research,* Thousand Oaks, CA: Sage.

Yin, R. K. (2009) *Case Study Research: Design and Methods,* 4th ed.*,* Thousand Oaks, CA: Sage.

Yin, R. K. (2014) *Case Study Research: Design and Methods,* 5th ed.*,* Thousand Oaks, CA: Sage.

Zachariadis, M., Scott, S. and Barrett, M. (2013) 'Methodological implications of critical realism for mixed-methods research', *MIS Quarterly,* 37(3), 855-879.

Özpolat, K., Rilling, J., Altay, N. and Chavez, E. (2015) 'Engaging donors in smart compassion: USAID CIDI's Greatest Good Donation Calculator', *Journal of Humanitarian Logistics & Supply Chain Management,* 5(1), 95-113.

Appendix A

Interviews Guide Version 1

Section 1: General Questions

- Please tell me about the organisation you work for.
- What is your role within the organisation? What does your work entail?

Section 2: Logistics and Supply Chain Management

- What role does logistics and supply chain management (LSCM) play in your organisation?
- How is LSCM planning done in your organisation?
    - Are there different levels (strategic/long-term, operational/day-to-day)?
    - What is done centrally versus locally?

Section 3: Characteristics of Messy Supply Chains

- How does the interaction with other parts of your organisation influence LSCM planning?
    - Is there any joint planning with other organisations?
- Do you have any contingency plans for changes to LSCM over the course of a mission?
- How does the operational environment influence your LSCM activities?
- How does the wider political environment affect LSCM in your organisation?
    - How is this impact reflected in your planning procedures?
- Which groups influence your LSCM planning and why?
- How are differences in opinion addressed?
- What are the gaps of information for LSCM planning?
    - What sources of information do you use instead?

Section 4: Future Supply Chain and Logistics Planning

- What does a successful LSCM mission look like?
- How do lessons learned in previous missions affect your LSCM planning?
    - Is there a process in place to record lessons learned/ create a feedback loop?
- Which aspects of LSCM planning are most difficult for your organisation?
- How could these difficulties be overcome?

Appendix B

Interviews Guide Version 2

1. Could you tell me a little about your role in the organisation?
    a. How do you contribute to the overall mission of the organisation?

2. What are the key challenges for logistics in your organisation?
    a. How is the unique operating environment reflected in your logistics practice?

3. How are missions/projects, particularly logistics aspects, planned?
    a. short-term/strategic planning
    b. central/autonomous

4. Which different parties (within and outside the organisation) are involved in the planning process?
    a. Stakeholder involvement in planning
    b. How are differences in opinion addressed?

5. What is the socio-political impact of your work?
    a. How do you assess that impact?
    b. Which socio-political factors influence your work?

6. Which sources of information are used in the planning process (personal experience, manuals, data bases…)?
    a. How does past experience influence future activities?
    b. Is there a formal process for recording lessons learned?

7. How do you think logistics planning could be improved?
    a. What are the barriers to improvement?
    b. Is there an optimal solution?

Appendix C

Interviews Guide Version 3

1. What are the key challenges for logistics in your organisation?

2. Which different parties (within and outside the organisation) are involved in logistics?

3. In how far is politics affecting your work?

4. Is your work mainly ad hoc or are there also routine aspects to it?

5. How are missions, particularly logistics aspects, planned (operational/strategic planning, central/autonomous…)?

6. Which sources of information are used in the planning process (personal experience, manuals, data bases…)?

7. What are the key capabilities humanitarian logisticians must possess? What helps them manage the complexity of their work?

8. How do you think logistics could be improved? What are the barriers to improvement?